

The Feasibility of Using the Digital Images from Unmanned Aerial Vehicle to View the Surface Soil Moisture

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The traditional methods for analyzing wide ranges of surface soil moisture of spatial distribution surveys, may require plenty resources besides the high cost. Therefore, this research applies the Unmanned Aerial Vehicle technology for its flexibility and its limitless options in the digital imaging field. After collecting the data from the digital image hue, the correlation coefficient of the image hue and the surface soil moisture is analyzed; the results will determine the feasibility of this method.

In this study, we use the Unmanned Aerial Vehicle (UAV) to take an aerial photo of the fallow farmland. Simultaneously, we take the surface soil sample from 0-10cm of the surface. The soil will be baking by 110° C, 24hr. And the software ImageJ 1.48 is applied for the analysis of the digital imaging and the hue analysis into Red, Green and Blue (R, G, B) hue values. The correlation analysis is the result from the data obtained from the images hue and the surface soil moisture at each sampling point.

The cross correlation is negative result which shows that the results of our findings are similar to other related researches. And the soil moisture is spatial heterogeneous. Cross correlation coefficient between moisture and hue is also heterogeneous. So the soil characteristic is heterogeneous. And Red hue has better spatial heterogeneity in cross correlation analysis. According to spatial distributions of the soil moisture and of cross correlation coefficient between moisture as well as image hue, the correction of spatial distribution in the middle site is better than other places. The cross correlation coefficient of red hue has more variety which shows the analysis of image with red hue being robustness. And the cross correlation coefficient is more negative than positive. This result is as same as the other research.

In our researches, student will analyze the soil moisture and take the digital image from Unmanned Aerial Vehicle. Based on the result of soil moisture and image hue, we can find out the relationship between soil moisture and digital image hue.

Based on the outcomes of the research, using digital images from UAV to estimate the surface soil moisture is acceptable. However, further investigations need to be done in order to verify the relation between the image hue and the soil moisture for reliable moisture estimations. So we need enough soil and image samples and control the deformation of image to find a reliable result. And it is better to use the digital dingle lens reflex camera to prevent the deformation of the image and have a better auto exposure.

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