

Estimating the fractional vegetation cover using fixed-wing drone and multiple vegetation indices

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Fractional vegetation cover (percentage of vegetation cover) plays a key role in characterizing the conditions of the terrestrial environment. To analyze the distribution of the vegetation conditions, several methods and models can be found for estimating its coverage. Remote sensing techniques, especially utilizing the satellite imagery is one of the major approaches due to its applicability in larger spatial extent and multiple channels observed from different electromagnetic spectra. Although, in cases of high frequent cloud covering regions such as the tropical regions, usually this is difficult to conduct. Thus, in this work, we seek in alternatively collecting a remotely sensed imagery from a fixed-wing drone and analyze to estimate the fractional vegetation cover of the study site. Normal RGB camera and multispectral sensors were carried onboard the fixed-wing drone, and multiple images were collected. The Structure from Motion method was implemented to develop an ortho image of the whole study site. The imageries were used to further develop a general land use/land cover (LULC) map of the site, and within the determined gridded area, the fraction of each LULC types were examined with different vegetation indices (VIs) computed from the multispectral data. Clear positive trend was found with increasing VIs and increasing fractional cover of healthy trees, and clear negative trend was found with decreasing VIs and increasing fractional cover of soils. This approach demonstrates that it is possible to analyze the coverage information through the utilization of drones, which can be also used as ground truthing, moreover, the findings would play an important role in further simulating such as the water cycles.

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