

Spectral imaging within the forest matrix

Type

- Master Thesis

Supervisors

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Abstract

Spectroscopy can measure optical properties of vegetation. These measurements can then be used to predict ecological properties of vegetation, such as biomass, nutrient or water content, as well as plant functional traits. Spectral sensors are usually mounted to drones, planes or satellites, hence collect spectral information from the top of the vegetation canopy. For this purpose, the spectral information is extracted using the relationship between incoming sunlight and the light reflected from the vegetation. If we are, however, interested in assessing differences in vegetation properties within complex 3-D vegetation structures, spectral information should be collected from within the vegetation, i.e., within the forest matrix. However, in such a case the incoming light measured on top of a drone does no longer correspond to the full sunlight. It therefore is unclear how measurements made within a forest can be adjusted to still represent the characteristics of the vegetation. The goal of this MSc thesis is to 1) evaluate different sensors that could be used on lightweight drones, 2) collect spectral measurements within the forest matrix and 3) calibrate/compare the output to laboratory measurement of vegetation properties.

Keywords

spectroscopy, multispectral sensors, forest matrix, vegetation characteristics

Work packages

- Familiarize with the problem in collaboration with partners
- Literature review of related work
- Overview of sensors (spectroscopy, multispectral devices, light)
- Collection of spectral data within the forest matrix
- Collection of leaf samples within the forest matrix; laboratory analyses
- Calculate indices of vegetation characteristics based on spectral data
- Comparison of spectral information and ground truth data.

Requirements

- Basic knowledge of imaging spectroscopy and laboratory analyses
- Advanced mathematical skills for data processing
- High motivation and interest in researching potential sensors
- Methodological and goal-oriented working behavior

Work location

- Primary work location will be Uni ZH
- Secondary work location will be WSL

Contact details

Please send a motivation statement, a copy of your CV and transcript to:

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