

MSc Thesis
Research Collaboration with the Swiss National Park

Mapping Plant Functional Diversity of Grasslands in the Swiss National Park using Imaging Spectroscopy Data

Background

The loss of biodiversity and the associated decline of ecosystem services vital for nourishing demand a comprehensive monitoring of plant biodiversity. Biodiversity affects productivity and stability of an ecosystem, and plays a critical role in maintaining ecosystem functions.

A number of studies have shown that ecosystem functions are strongly linked to locally measured plant traits and their variations. This relationship between trait diversity, called plant functional diversity, and ecosystem functions is likely to be scale dependent.

Modern remote sensing systems bear the potential to close the gap produced by a limited availability of trait measurements on large spatial scales. However, the discrete scaling concepts of alpha and beta functional diversity adopted in ecology need to be better embedded or redefined to the continuous mapping and spatial resolution of remote sensing datasets.

Accordingly, a comprehensive analysis of functional diversity patterns that include spatially contiguous quantifications of traits and trait variations is needed.

Project aims

The main aim of the proposed master project is therefore to:

- i) quantify functional traits with the 1-D columnar radiative transfer model PROSAIL using AVIRIS-NG imaging spectroscopy reflectance data at canopy level from the Swiss National Park and its surroundings;
- ii) assess alpha and beta functional diversity on pixel and object-based approaches;
- iii) validate the results with existing field data. The main focus lies on grasslands being a challenging ecosystem to remotely sense due to high species density.

Beside investigating the remotely sensed functional diversity patterns, the method can be applied to answer questions regarding management impact on biodiversity and ecological connectivity.

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