FICHE PROJET

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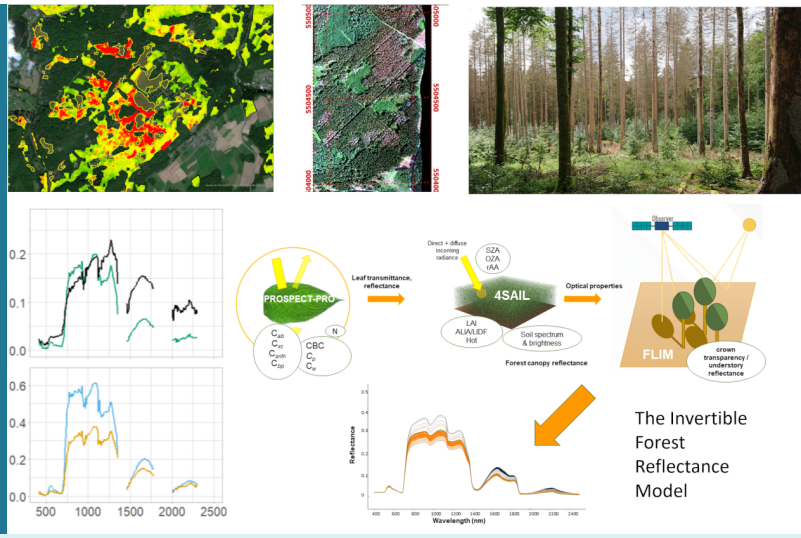
FORFUS-RT3.4

PhD project on satellite monitoring of forest traits under disturbance, part of the "Forest function under stress" doctoral training unit (FORFUS)



The Invertible Forest Reflectance Model

This project is part of the doctoral training unit FORFUS: Forest function under stress

Inspiration

Stress and disturbances cause changes in the biochemical (pigments (Cab), water content (Cw)) and structural (LAI, stem density, fractional tree cover) properties of forests. However, the ways in which different types of forest disturbance affect plant and forest traits and the associated spectral, spatial and temporal patterns that are present (yet hidden) in remote sensing (RS) data are still poorly understood. Knowing how plant traits change for a forest stand under disturbance will allow us to correctly interpret the patterns in time series of multi- and hyperspectral RS data for improved forest disturbance detection.

Innovation

The objectives of FORFUS-RT3.4 are to (a) improve existing methods for mapping and monitoring forest traits from high-resolution optical satellite data and b) gain a better understanding of how forest disturbances affect plant traits over time in selected forests of the Greater Region.

The doctoral candidate will develop and apply an existing fast and efficient forest trait mapping method based on the existing Invertible Forest Reflectance Model and hybrid methods with shallow and deep learning algorithms. The accuracy of the forest trait retrieval method will be validated locally against drone, field and lab data collected at experimental sites over LIST's extensive network of monitoring sites in collaboration with other FORFUS topics. The method developed will be applied to satellite data (Sentinel-2, EnMAP, PRISMA, Planet) of forests in the Greater Region, and the trait maps obtained (Cab, Cw, LAI, specific leaf area) will be analysed together with the forest disturbance databases and geospatial data layers (geology, climate, soil, hydrology, forest management) available.

Impact

This project will lead to an improved hybrid radiative transfer model inversion method for high-resolution satellite-based forest trait mapping. The scientific knowledge generated in this project will help to understand the effects of disturbance types on forest traits and will improve disturbance detection from RS archives. The understanding and methods developed as part of the project are expected to be useful for similar studies of different forests around the world and will strengthen our ability to identify and monitor forest disturbance over large areas.

Partenaires

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