Title: **“Integration of High-Resolution Satellite Imagery with LAI-2200C Plant Canopy Analyzer Data for Improved Spatial and Temporal Characterization of Crop Growth in Diverse Agricultural Fields”**

This project proposes an integrated approach to enhance the spatial and temporal characterization of crop growth within heterogeneous agricultural fields. Utilizing LAI-2200C Plant Canopy Analyzer data, collected from various fields, and 10-meter resolution satellite imagery, the study aims to overcome the limitations of homogenized measurements by incorporating local soil variations, shading effects, and crop growth disparities. The research aims to provide a detailed understanding of the spatial and temporal dynamics of crop development, ultimately contributing to precision agriculture and improved field-level management.

Objectives:

1. Integrate high-resolution satellite imagery with LAI-2200C Plant Canopy Analyzer data to capture spatial variations in crop growth within heterogeneous fields.
2. Explore the influence of local soil properties, shading effects, and other factors on the observed variations in crop growth.
3. Develop a methodology for harmonizing and co-analyzing LAI-2200C Plant Canopy Analyzer data and 10-meter satellite imagery.
4. Characterize the entire fields at different time stamps using 10-meter satellite data to account for spatial heterogeneity.
5. Investigate the correlation between satellite-derived field characteristics and LAI-2200C Plant Canopy Analyzer measurements.

Methodology:

1. Acquire LAI-2200C Plant Canopy Analyzer data collected from various fields at Heidfeldhof between 2020 and 2024.
2. Obtain 10-meter resolution satellite imagery covering the same time periods to characterize the entire field.
3. Develop algorithms and methodologies to integrate and harmonize LAI-2200C Plant Canopy Analyzer data with satellite imagery.
4. Analyze spatial and temporal variations in crop growth, considering local soil properties and shading effects.
5. Validate the integrated analysis by comparing results with ground truth measurements and field-level observations.
6. Explore correlations between satellite-derived field characteristics and LAI-2200C Plant Canopy Analyzer measurements.
7. Provide recommendations for precision agriculture strategies based on the integrated findings.

Expected Outcomes:

1. Improved spatial and temporal characterization of crop growth within heterogeneous fields.
2. Validation of the integrated methodology through comparisons with ground truth measurements.

3. Insights into the influence of local soil properties, shading effects, and spatial heterogeneity on crop development.
4. Correlations between satellite-derived field characteristics and LAI-2200C Plant Canopy Analyzer measurements.