

openEO Platform - Fractional Canopy Cover

Project summary

Part of the ESA Network of Resources (NoR) sponsoring

Request ID 1b1690

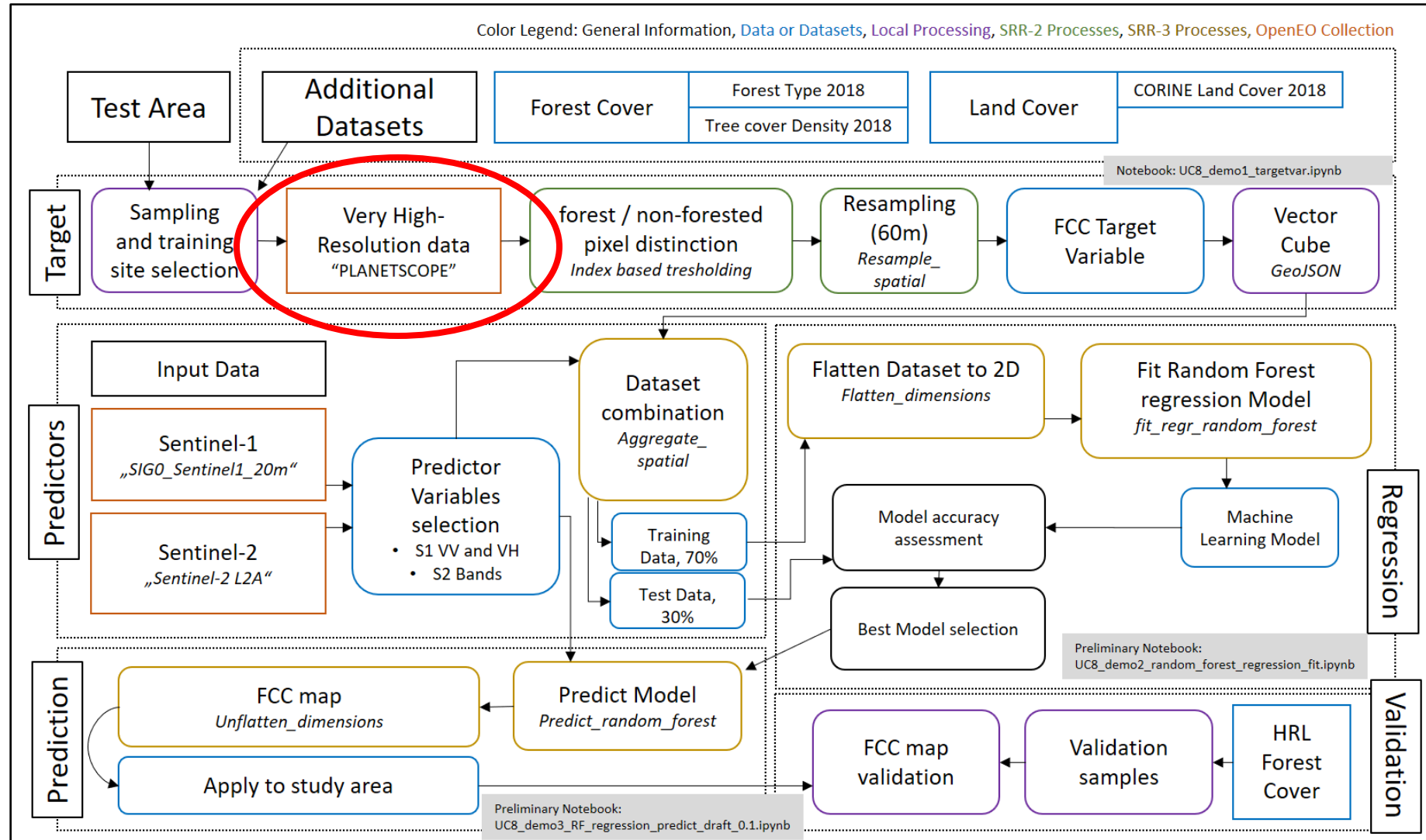
Project Objectives

- Derivation of **features** from Sentinel-1 and Sentinel-2 data such as reflectance, backscattering coefficients, NDVI, polarization index
 - Identification of **areas** which represent different land cover types under investigation
 - **Identification of the sample from VHR** images by threshold to identify different levels of vegetation cover
 - **Downscaling** of the sample areas to medium resolution scale
 - **Calibration and training of the regression models** using the selected features and different models
 - **Prediction** of Forest Canopy Cover (FCC)
- Need of abundant VHR data for training of a regression model

Project Objectives

Six thematic blocks:

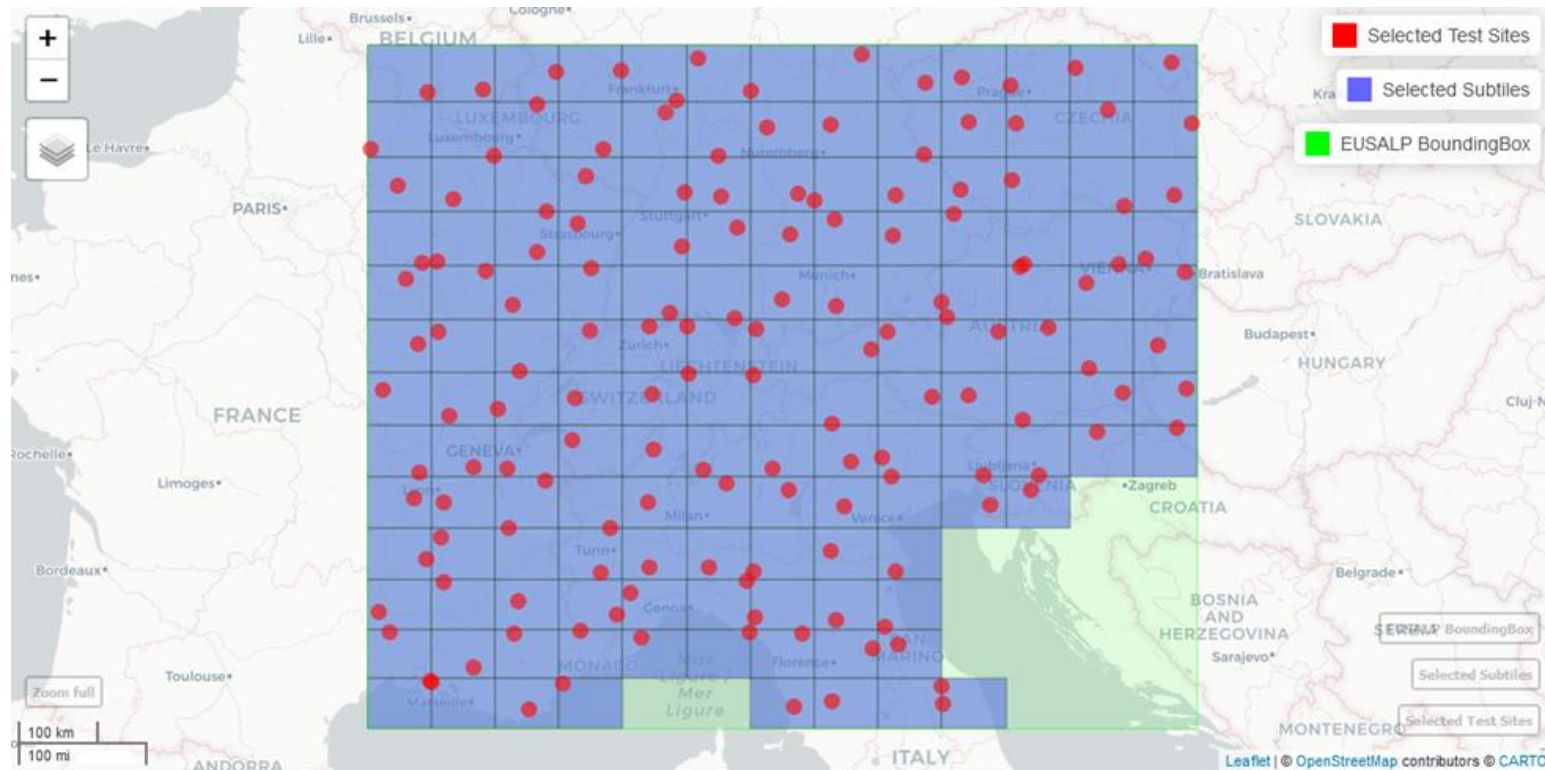
1. Additional datasets
2. Target variable
3. Predictors selection
4. Regression fitting
5. FCC prediction
6. FCC map validation



Use case workflow diagram (highlighted: integration of VHR data within the workflow)

PlanetScope data

The test sites for which the PlanetScope data is requested is sampled in stratified way (blue tiles) throughout the study area (green). For each of the 150 study sites the whole PlanetScope time series from 2018 to 2021 was requested through the ESA NoR (red points) with the management under area modality.

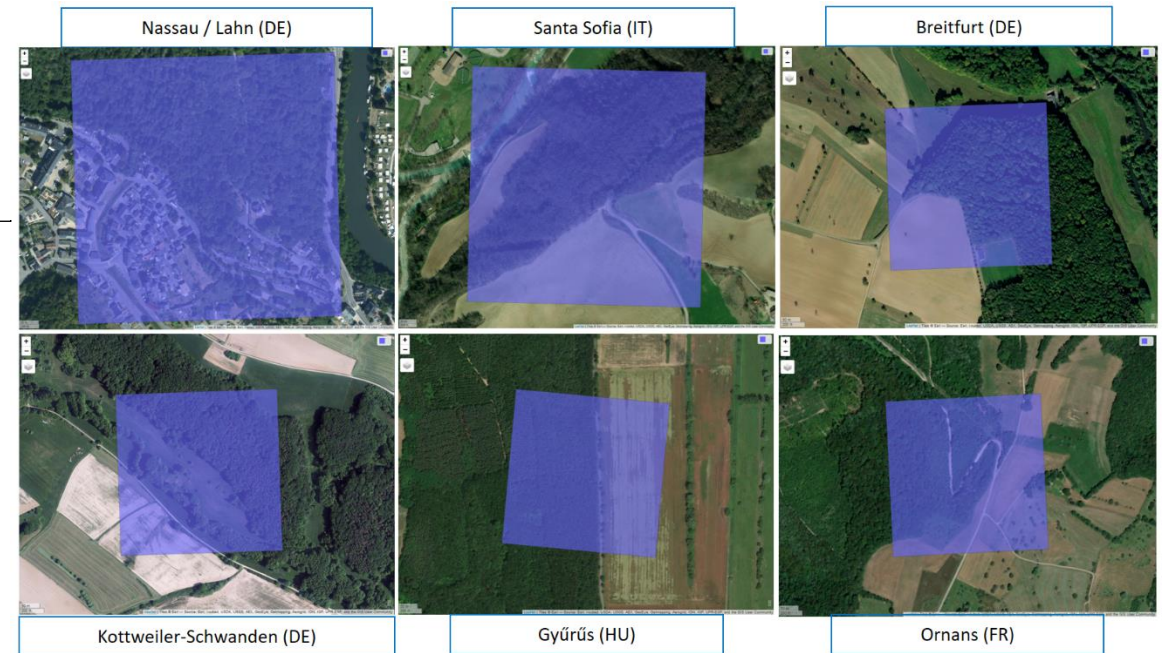


PlanetScope data

Some exemplary test sites are reported on the right side based on the following criteria:

- Both forest and non-forested areas should be present
- Other classes should enclose non-forested areas such as artificial surfaces, water bodies or agricultural areas
- Spread throughout the study area

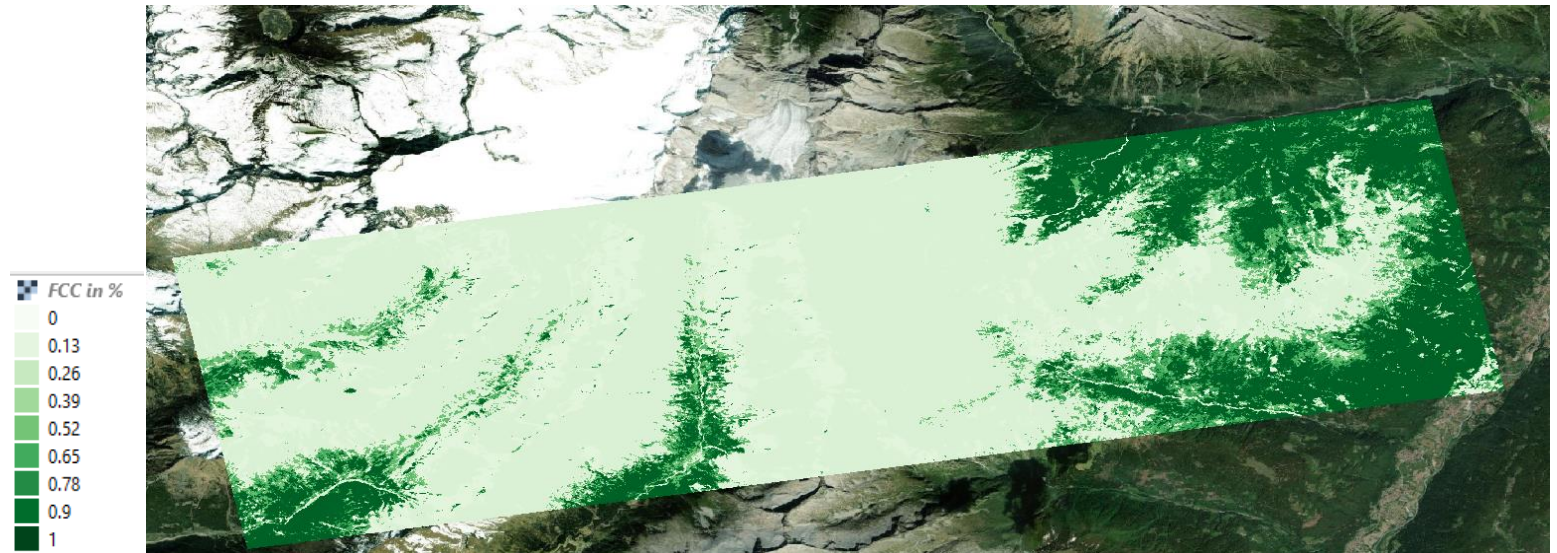
The result is a binary forest / non-forest information (b) as well as a resampled representation of the FCC (c). In order to fit both Sentinel-1 and Sentinel-2 resolution and to reduce the influence of geometry the result was resampled to 60 m (c).



Prediction

The PlanetScope data has been used to train a randomForest regression model using the developed functionalities in openEO Platform.

A first prediction result is reported here in the Adamello group, Northern Italy, for an extent of approx. 160 km².



Conclusion and next steps

The PlanetScope data has been very important for the project due to:

- High **temporal resolution** leading to stable forest masks
- Thresholds approach **very stable** for binary forest / non-forest classification
- Prediction with Sentinel-2 based on PlanetScope data provides **good first results**
- Management Under Area modality shows **high potential for forest related research**
- Included **in a cloud-based workflow** in openEO Platform.
- Basis to understand how **to include commercial EO-data** in the federated environment

Next steps:

- Improvement of the prediction with new predictors/features
- Implementation of a more advanced classification mechanism for the forest / non-forest masks
- Validation of the results
- Large scale prediction over the whole EUSALP extent