Project Report

Urban and Peri-urban Trees Classification (UP-Tree)

NoR – ID3322cc

Project objective:

Design, planning, monitoring and maintaining urban and peri-urban trees: it can be made possible by utilizing a combination of different satellite data, airborne lidar and in-situ measurements supporting the different owners of parks and green areas in a city (e.g. State, Regions, Cities, Provinces, other public entities, private citizens and companies)

Project methodology:

Methods will explore up to date approaches for single tree detection through multi-resolution segmentation and vegetation classification with AI approaches based on the elaboration of large integrated dataset from remotely sensed data (Big Data).

Platforms Used
Google Earth Engine (GEE)
QGIS
SNAP

How using tools and data within cloud environments helped achieve goals

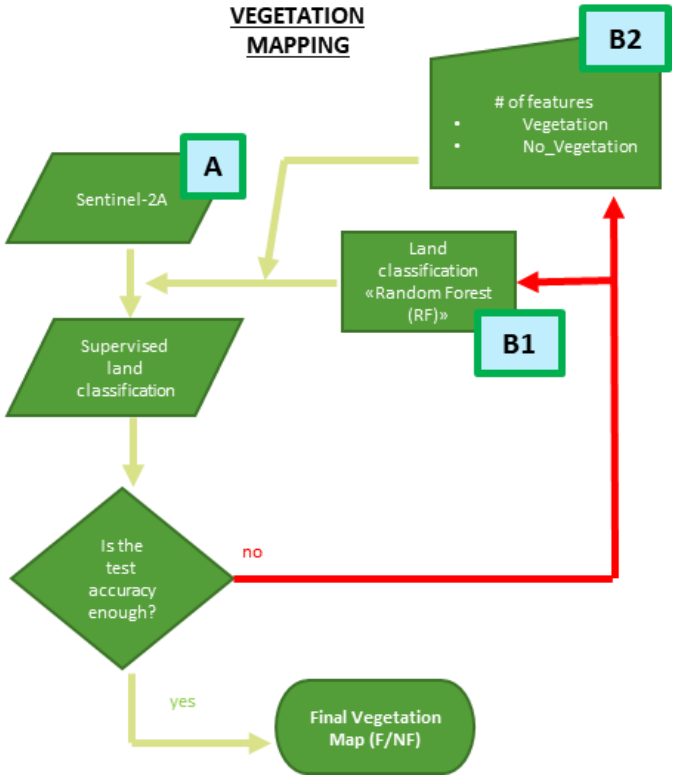
The Cloud Virtual Machine was used for the acquisition of Sentinel-1 and Sentinel-2 products and for their processing with the SNAP application. The VM was also used for the implementation and execution of threshold-based and Machine-Learning algorithms in a Python environment.
Google Earth Engine and QGIS was used for the analysis of the vegetation maps.
And one of the most important useful of the cloud was regarding the possibility that high volumes of data obtained from parallel intermediate-processing steps was temporarily saved on the VM taking advantage of its high-capacity disk.

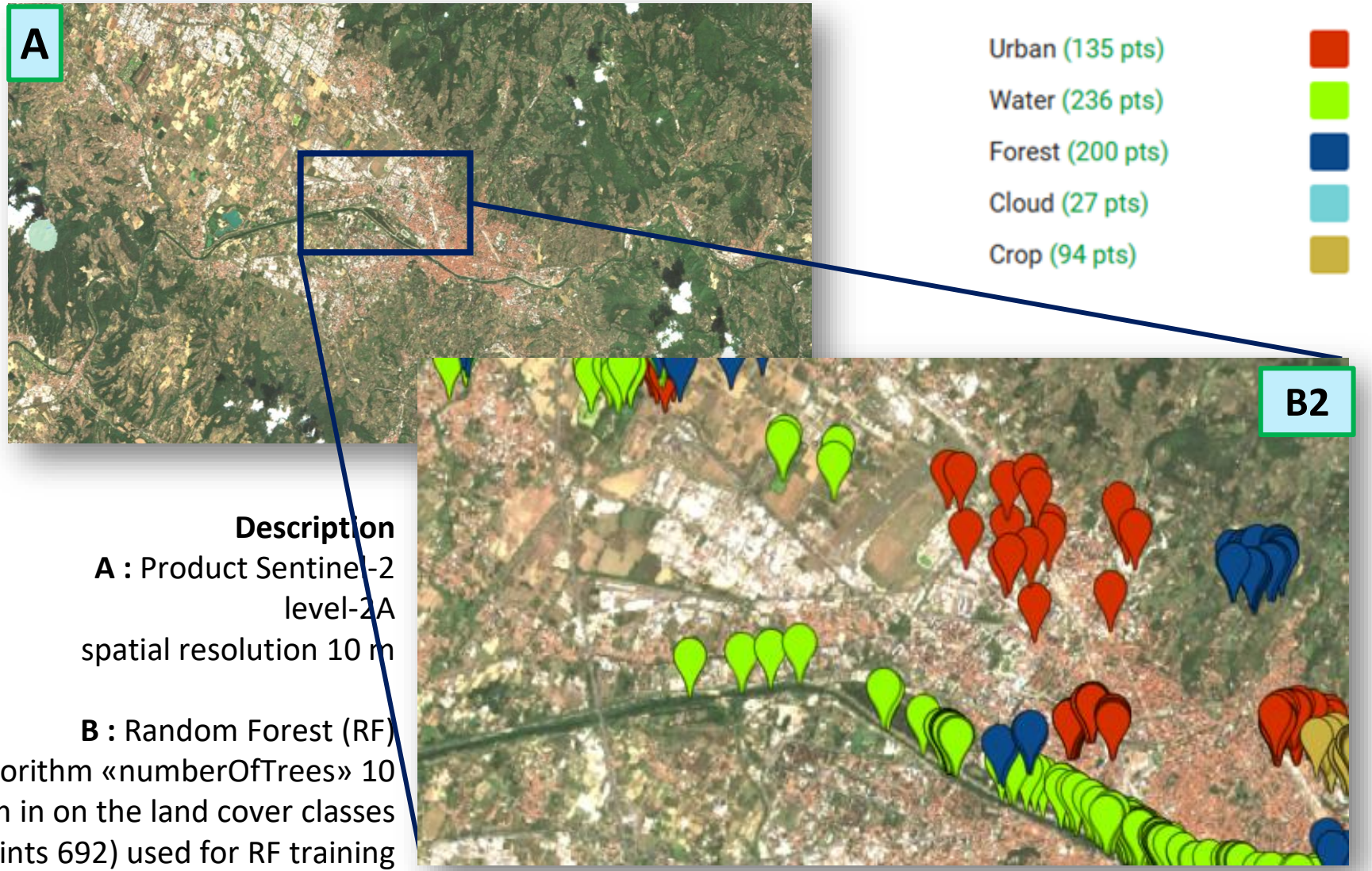
Benefits to society derived from UP-Tree project

With the application of the chosen algorithm, it was possible to spatially identify vegetation areas and individual trees with their size and species group.This result provided us with the possibility to evaluate the ecosystem services provided by the identified urban and peri-urban trees, which included air quality regulation, climate regulation through CO2 reduction, urban temperature regulation, noise mitigation, water flow regulation and runoff mitigation, assessment of the pollen situation.

Processing and results: **Google Earth Engine - Supervised Model Workflow**

Vegetation Mapping And Classification: Supervised Model Workflow





Description

A : Product Sentinel-2 level-2A spatial resolution 10 m

B : Random Forest (RF)

B1: Algorithm «numberOfTrees» 10

B2: Zoom in on the land cover classes (total points 692) used for RF training

Vegetation Mapping And Classification: Supervised Model Workflow

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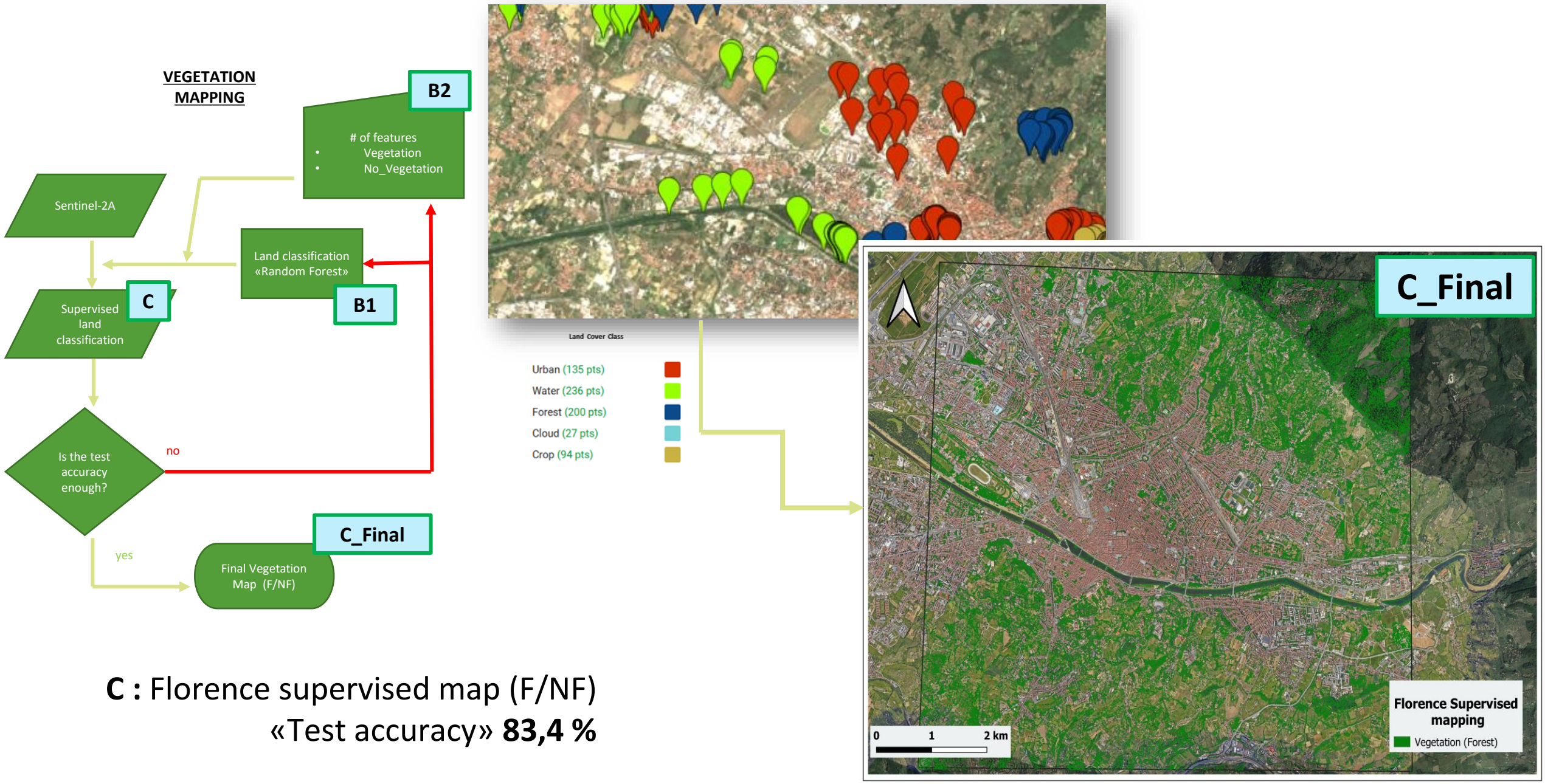

C : Florence supervised map (F/NF)
«Test accuracy» **83,4 %**