

# CLEAR-CUT MAPPING USING SENTINEL – 2 AND PRISMA HYPERSPECTRAL IMAGERY

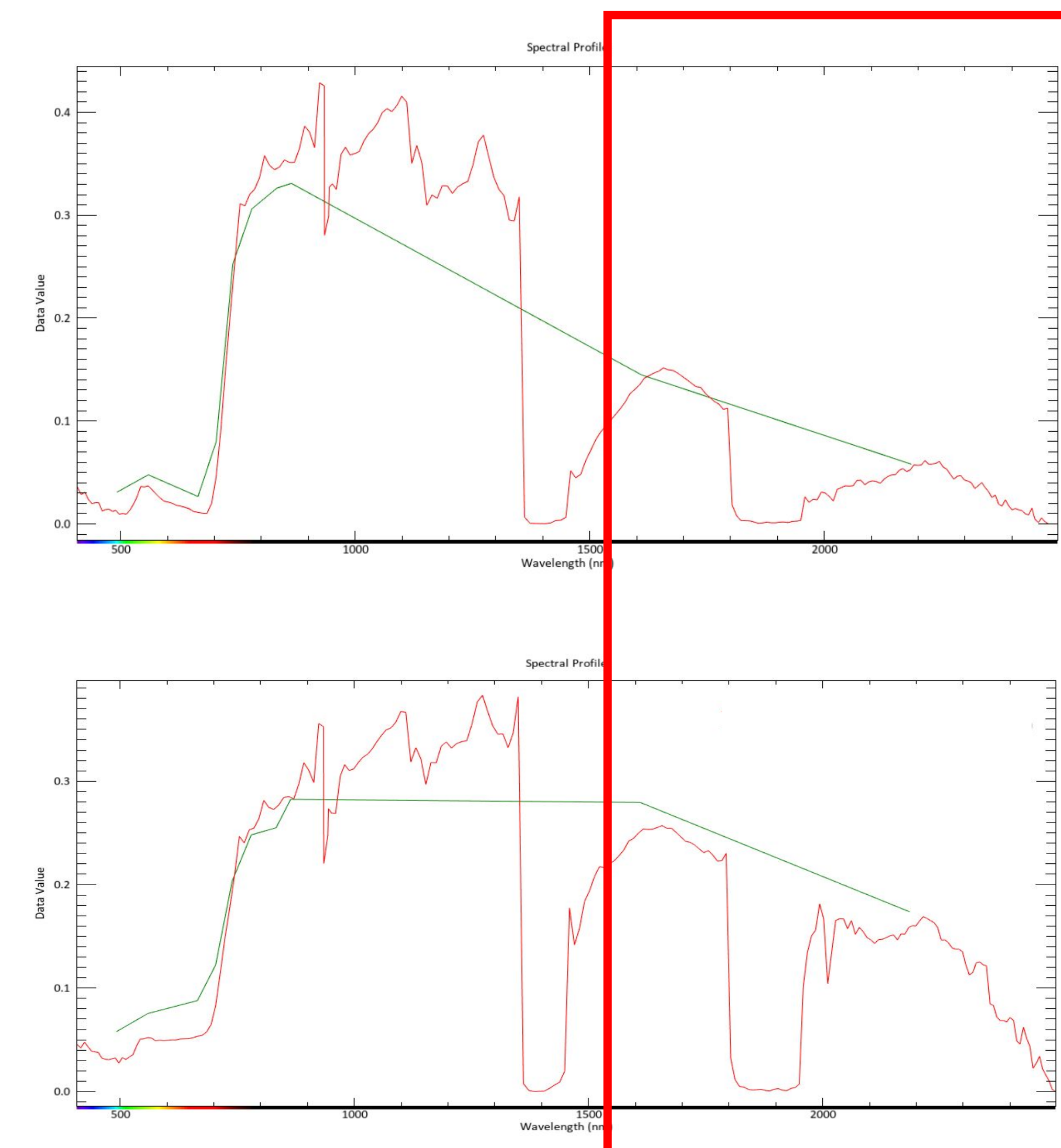
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## RESEARCH CHALLENGE

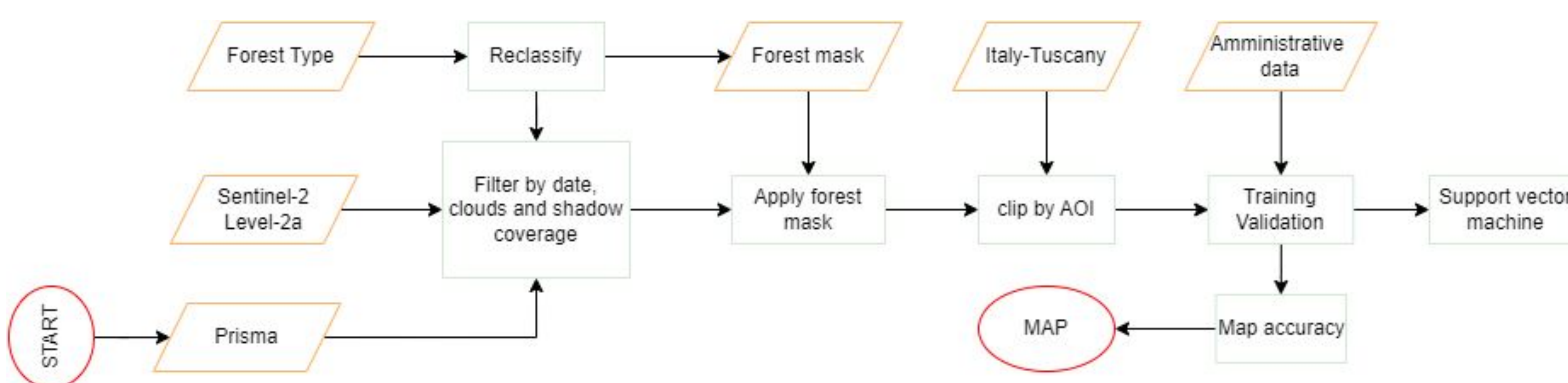
Forest ecosystems face increasing vulnerability due to stressors such as droughts, wildfires, human activities, clear-cutting, and land-use changes. **Protecting** these ecosystems and enhancing their functions are key goals of European forest and **biodiversity strategies**. The challenge of this study is to evaluate the added value of hyperspectral products from the Italian Space Agency (ASI) **PRISMA** mission coupled to multispectral Sentinel-2 data in detecting clear-cut areas. Multispectral remote sensing has become widely established as a means of monitoring forest anomalies. Much focus has been on reflectance measurements in the visible (VIS), near-infrared (NIR) and short-wave infrared (SWIR) wavelengths. PRISMA offers global coverage, with a spectral resolution of 12 nm with 180 bands, a spatial resolution of 30×30 meters and it is characterized by a repeat cycle of approximately 29 days. Due to the higher spectral resolution the **SWIR channel** offers a higher separability than the SWIR channel on Sentinel-2.



## 1 STUDY AREA AND DATASETS



## 2 PRE-PROCESSING OF SATELLITE DATA



### Confusion matrix

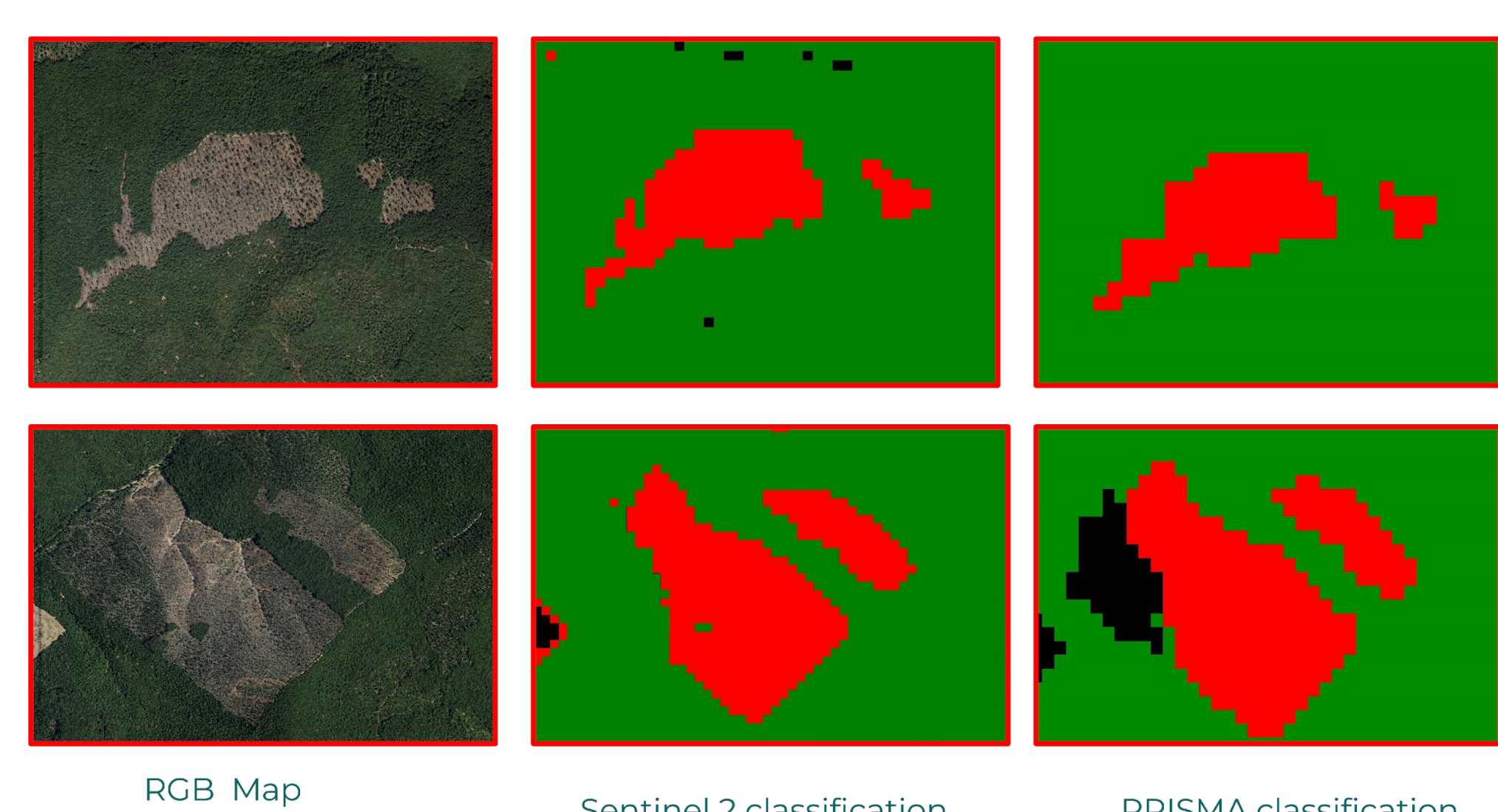
Sentinel 2		
	TP	FP
TN	1376	91
FN	26	671

Prisma		
	TP	FP
TN	1383	161
FN	40	606

Overall accuracy: 0.82 | 0.85  
kappa coef.: 0.65 | 0.71

## 3 CLASSIFICATION & RESULTS



Clear-cut Forest

- Hyperspectral satellite remote sensing is as effective as multispectral remote sensing data for the automated detection of clear-cut areas.
- The SWIR is the most sensitive and promising region of the spectrum for detecting harvest areas.
- The spectral resolution and high number of bands available by PRISMA enabled to tell apart current-year clear cuts from previous year clear-cuts, contrary to Sentinel 2.
- The minimum mapping area detected by either satellites was 0.5 hectares.
- Coupling of multispectral and hyperspectral remote sensing is recommended to, specifically, remove false-positives from Sentinel 2 detection of clear-cuts (i.e. performed 1+ years before).
- The benefits of hyperspectral remote sensing will be unleashed as soon as temporal resolution, global coverage, and ease of image accessibility will be improved by the next-to-be deployed constellations (CHIME, PRISMA 2G, IRIDE).

