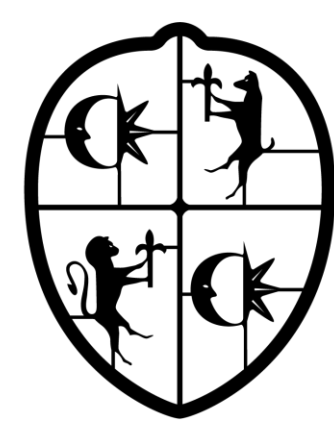


Mapping tree species in a mountainous region with Planet SuperDove and Sentinel-2 remotely sensed data and free forest planning data

Michele Dalponte, Jana Annika Wicklein, Chiara Benedetti, Davide Andreatta



FONDAZIONE
EDMUND MACH
dal 1874



OPEN EARTH
MONITOR

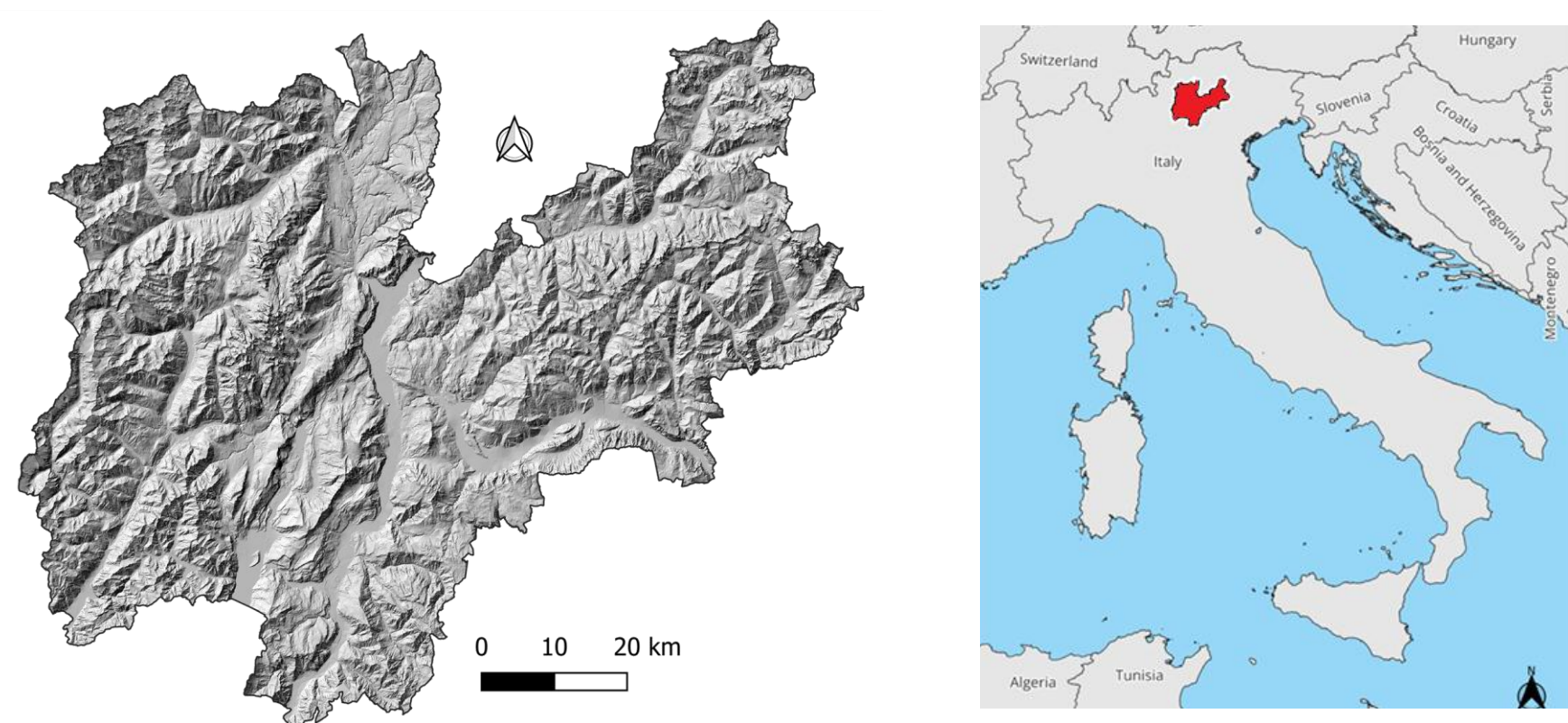
Funded by
the European Union

Objectives

To evaluate the performance of multitemporal Planet SuperDove (3 m) and Sentinel-2 (10 m) datasets for mapping tree species across the Autonomous Province of Trento (Italy).using free forest planning data.

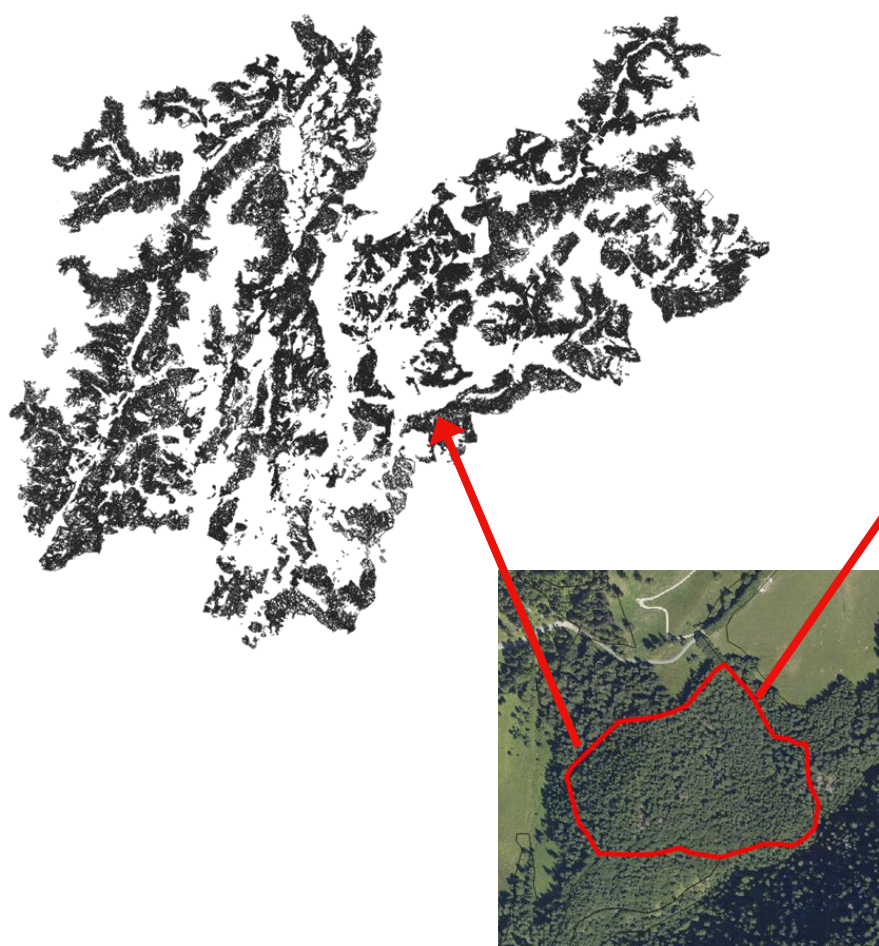
Study area

- Autonomous Province of Trento (Italy).
- About 3900 km² of forest areas.
- Large elevational gradient: 60 - 3600 m a.s.l.
- Four climatic zones: sub-Mediterranean, sub-continental, continental, Alpine.



Field data

- 121,177 Forest Management Units (FMUs) with species composition data.
- Average FMU area: 1.95 ha.
- 45 tree species.
- Field surveys from 2010 to 2021.



Year of the survey	2016
Upper canopy cover	80%
<i>Picea abies</i>	95%
<i>Larix decidua</i>	5%
<i>Abies alba</i>	Sporadic
<i>Fagus sylvatica</i>	Sporadic

Validation set

- 2732 points photointerpreted by three independent analysts.
- 25 species.

Methods

RS FEATURES

SENTINEL-2
PLANET SUPERDOVE
(monthly composites
June-October 2021)

CLIMATE FEATURES

EXTREME MINIMUM TEMPERATURE
MEAN COLDEST MONTH TEMPERATURE
MEAN WARMEST MONTH TEMPERATURE
MAXIMUM ANNUAL TEMPERATURE
DEGREE DAYS ABOVE 18
DEGREE DAYS BELOW 0
NUMBER OF FROST-FREE DAYS
CONTINENTALITY INDEX
ANNUAL HEAT MOISTURE
MEAN ANNUAL PRECIPITATIONS
SUMMER HEAT-TO-MOISTURE INDEX

LIDAR FEATURES

CANOPY HEIGHT MODEL
DIGITAL TERRAIN MODEL
SLOPE ASPECT
TOPOGRAPHIC WETNESS INDEX
HEAT LOAD INDEX
TOPOGRAPHIC ROUGHNESS INDEX

SOIL FEATURES

pH SOIL
SOIL CLAY

FIELD DATA

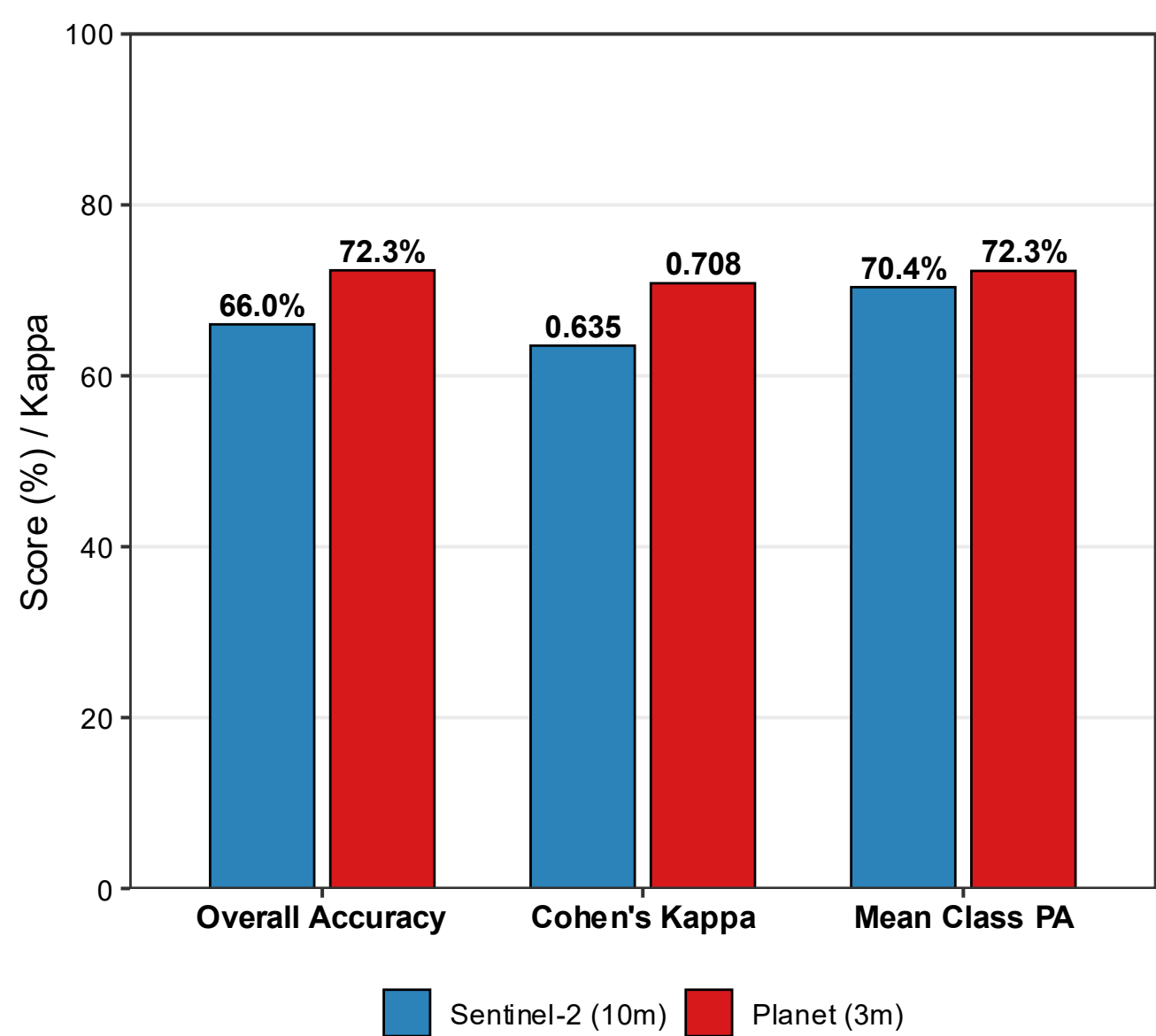
SUPPORT VECTOR MACHINES

TREE SPECIES MAP

Results

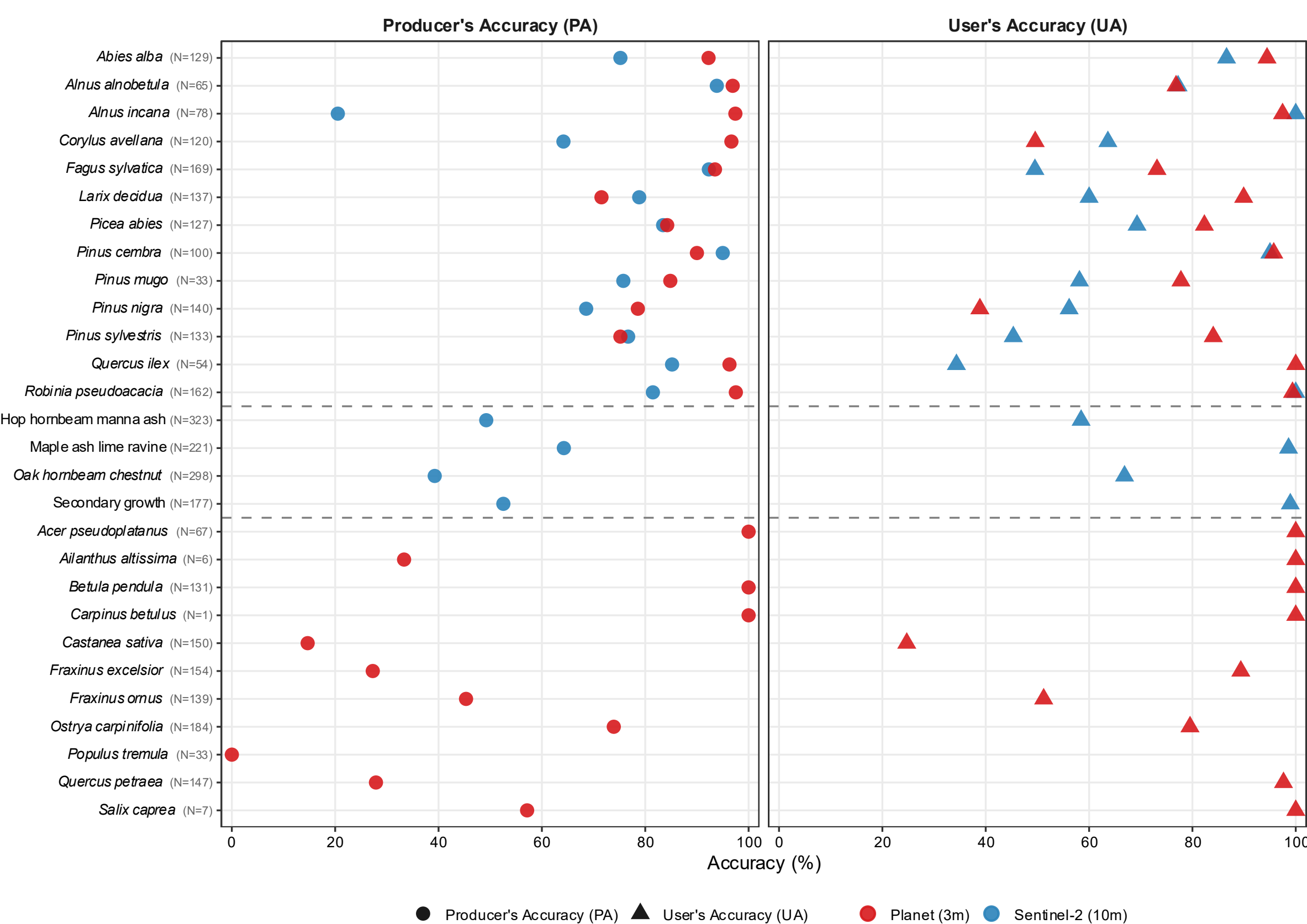
Global Accuracy Metrics Comparison

Evaluated on N = 2466 common validation points



Class-wise Accuracy Comparison

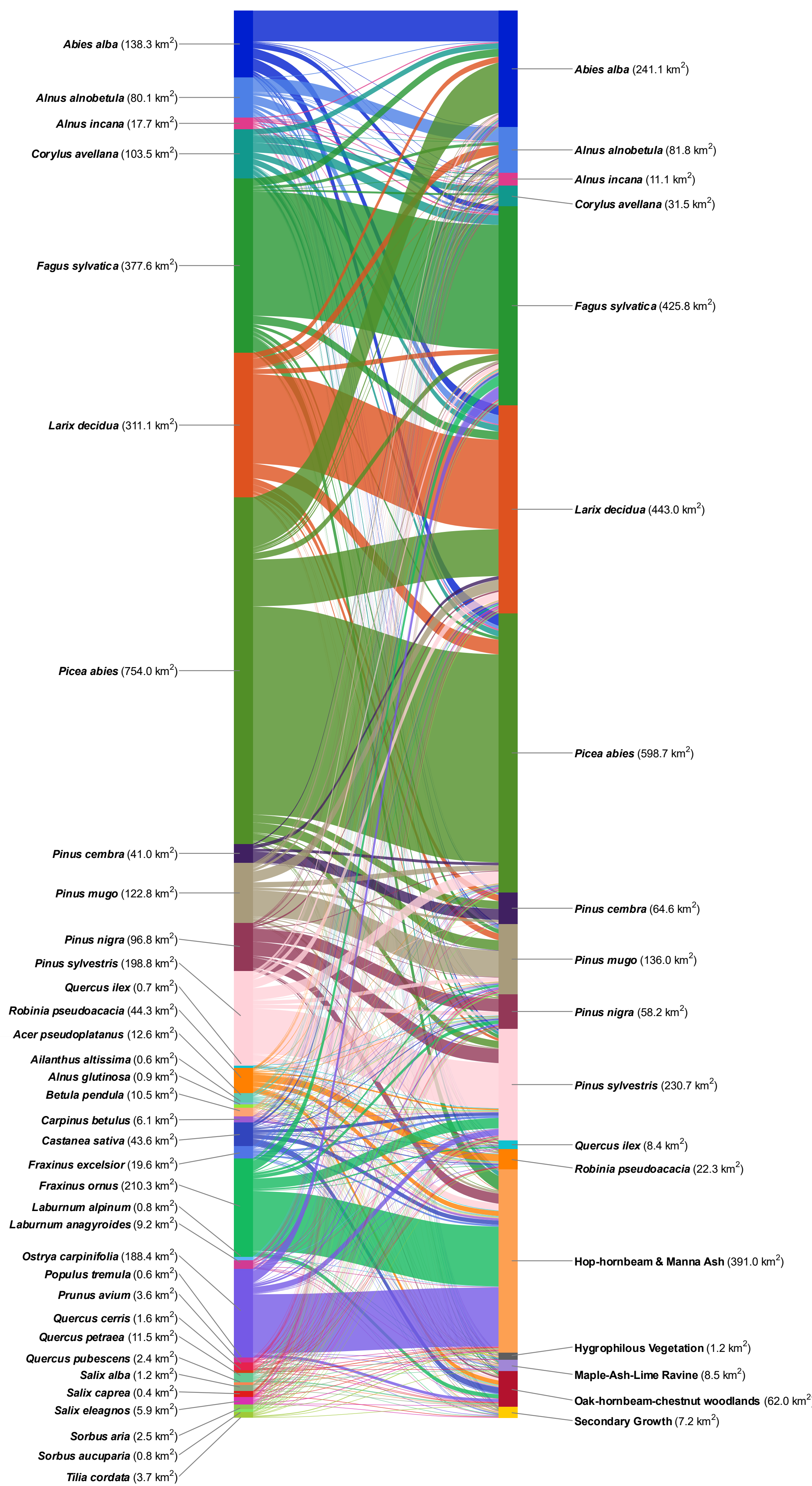
Sections (Top to Bottom): Common Species | Sentinel-2 Aggregated Classes | Planet-Only Species



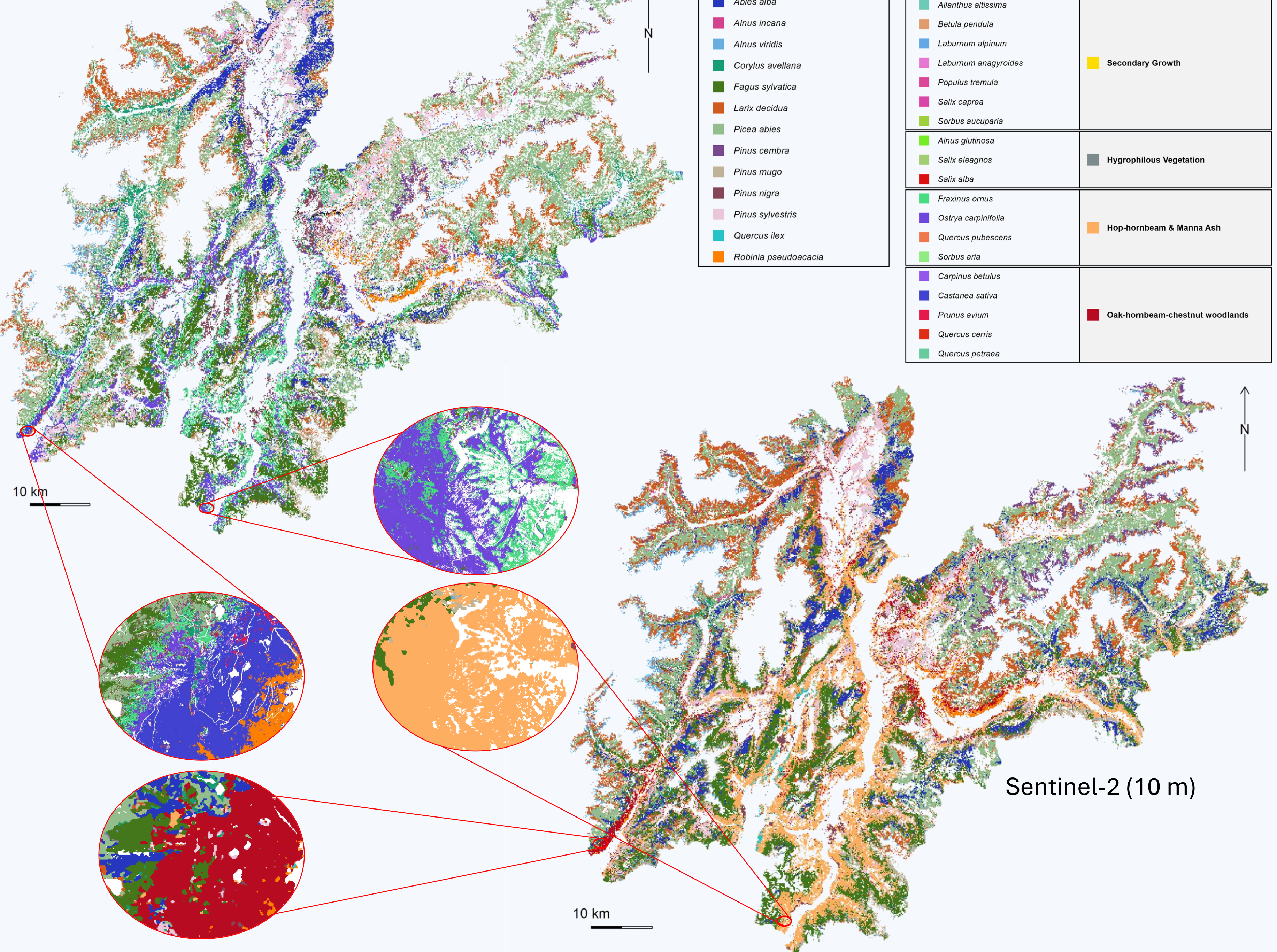
Pixel-wise Comparison of the Two Maps

Planet SuperDove (3m)

Sentinel-2 (10m)



Planet SuperDove (3 m)



Sentinel-2 (10 m)

Acknowledgments

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