WP 6.20: Cross-RI dataset provision of UAV multi platform hyperspectral data and site level measurements over different RI ecosystem sites (eLTER, ICOS, ANAEE) and comparison with satellite products

Jose Luis Pancorbo[1], Giandomenico De Luca[1], Federico Carotenuto[1], Lorenzo Genesio[1], Alessandro Montaghi[2], Beniamino Gioli[1]

[1]CNR-IBE, National Research Council of Italy, Institute of Bioeconomy, Via Madonna del Piano 10, 50145 Sesto Fiorentino, Italy

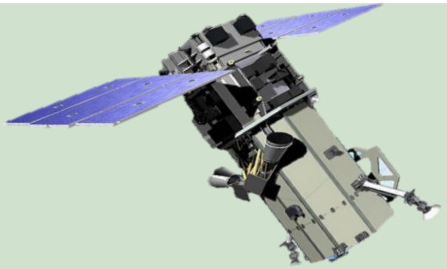
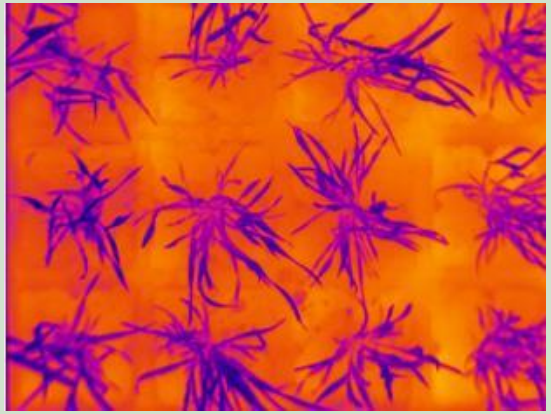
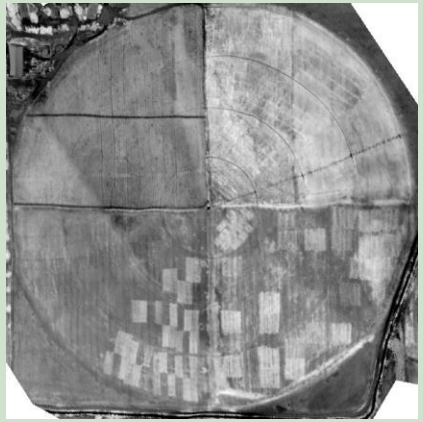
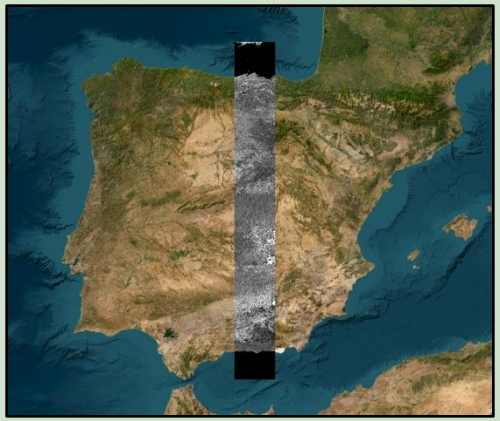
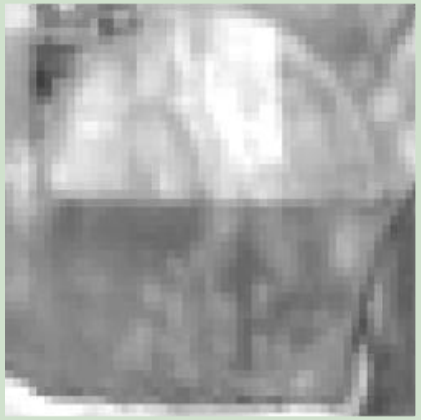
[2]CNR-IRET, National Research Council of Italy, Institute of Research on Terrestrial Ecosystems, Via Madonna del Piano 10, 50145 Sesto Fiorentino, Italy

joseluis.pancorbodeonate@cnr.it

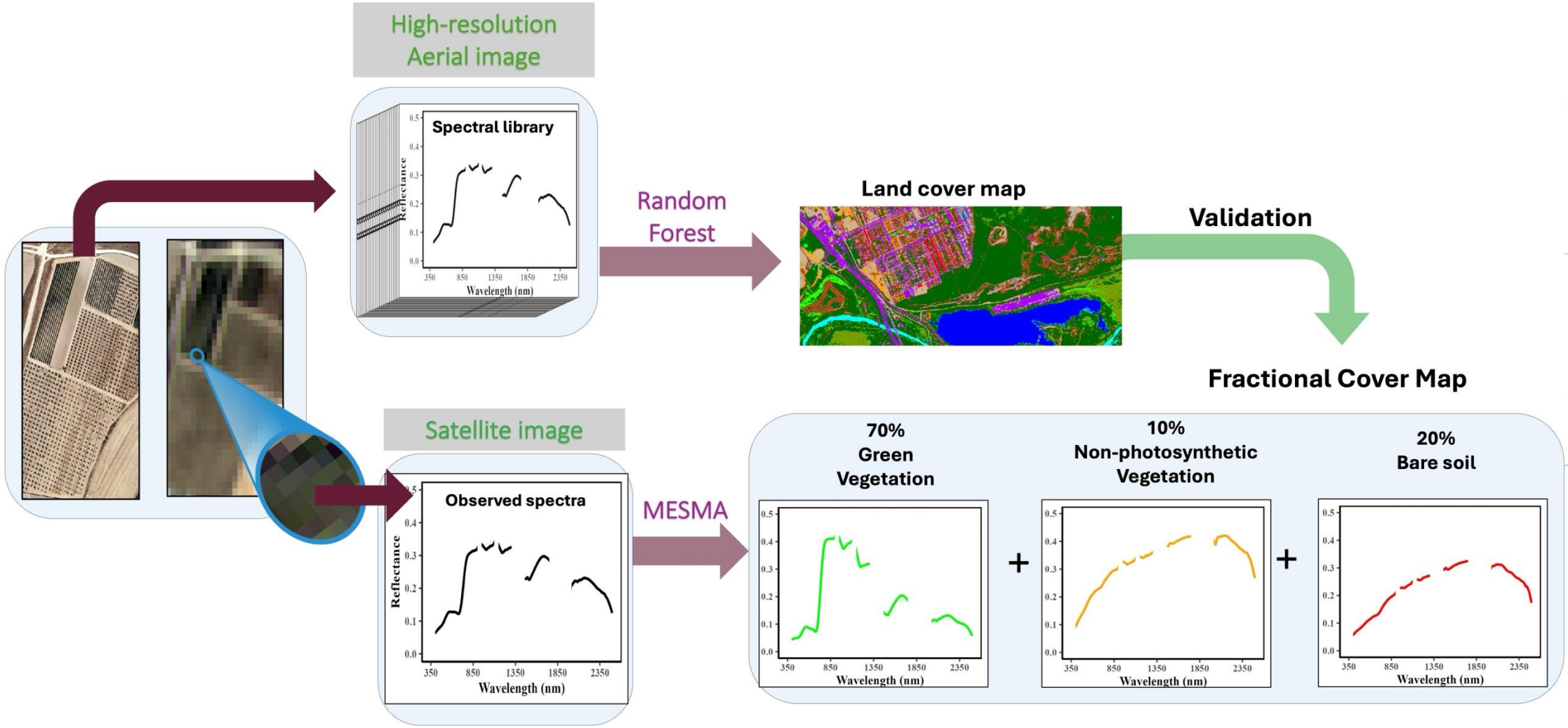
IR0000032 – ITINERIS, Italian Integrated Environmental Research Infrastructures System
(D.D. n. 130/2022 - CUP B53C22002150006) Funded by EU - Next Generation EU PNRR-Mission 4 "Education and Research" - Component 2: "From research to business" - Investment 3.1: "Fund for the realisation of an integrated system of research and innovation infrastructures"

Introduction to remote sensing

Platforms

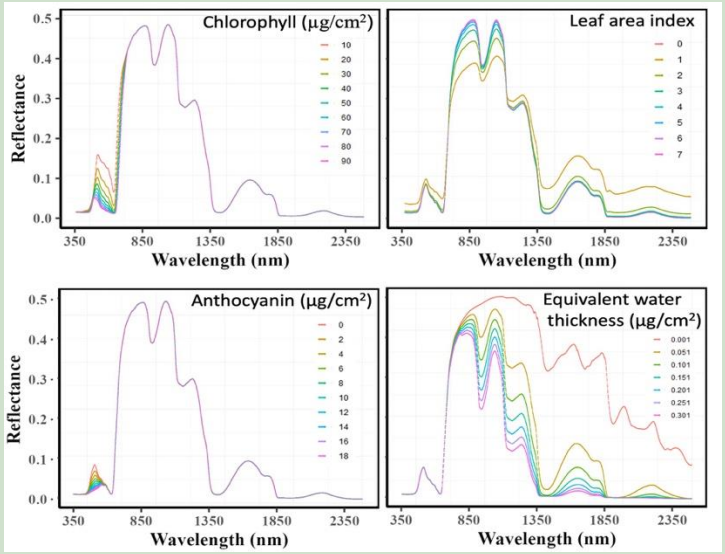
Aerial	Satellite
	
• Higher spatial resolution • Calibration/Validation	• Repeated observations • Large spatial coverage
 	 

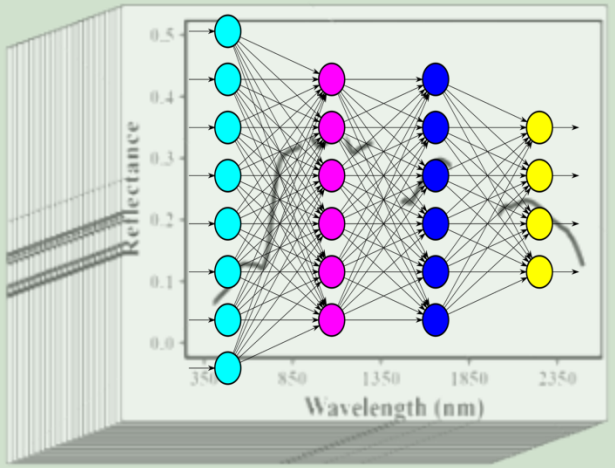
Multiple Endmember Spectral Mixture Analysis

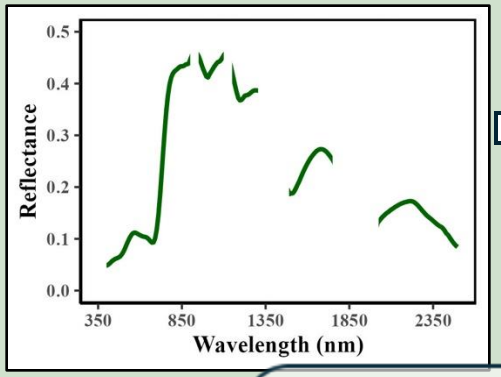


Hybrid Machine Learning – Radiative Transfer Model

i) Simulate spectra with RTM	ii) Train Machine Learning Model	iii) Estimation of plant traits







Plant traits

Chlorophyll = 10 (µg/cm²)

Leaf area index = 2

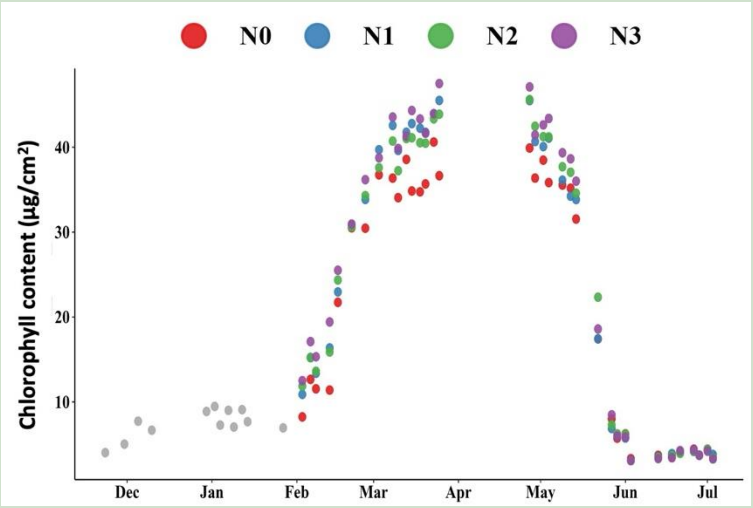
Anthocyanin = 4 (µg/cm²)

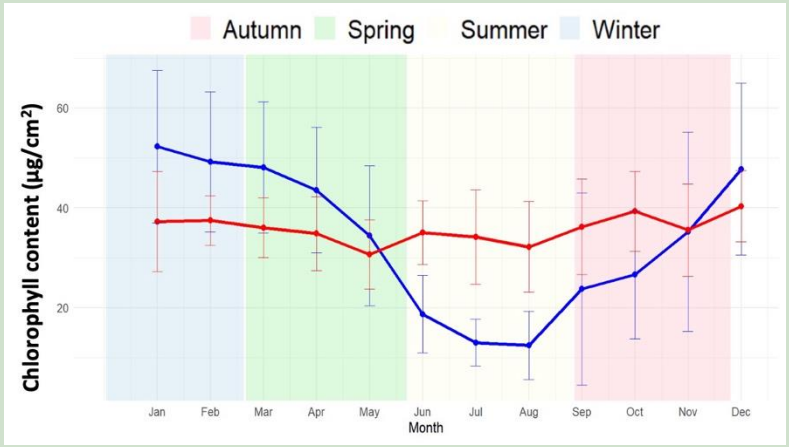
Water content = 0.001 (g/cm²)

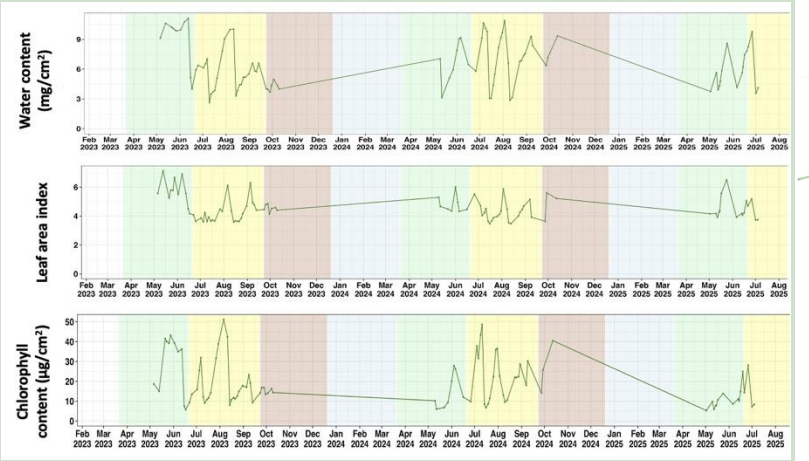
Hybrid Machine Learning – Radiative Transfer Model

Agriculture (model and data collected with Aerolab instrumentation)

Winter wheat N Fertilization adjustment	Identification of olive management practices	Alfalfa canopy dynamics for optimizing yield



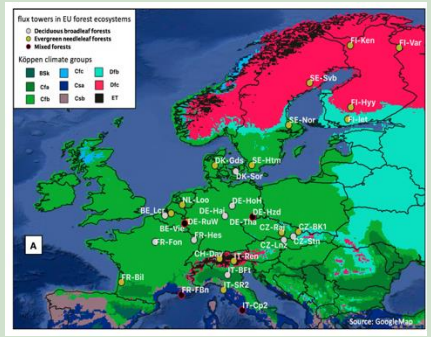


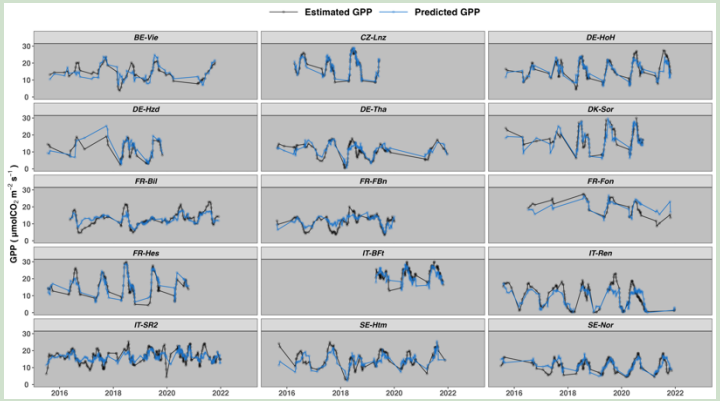


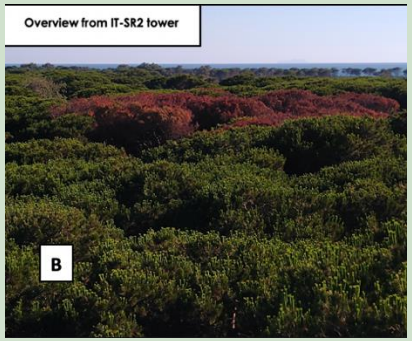
Hybrid Machine Learning – Radiative Transfer Model

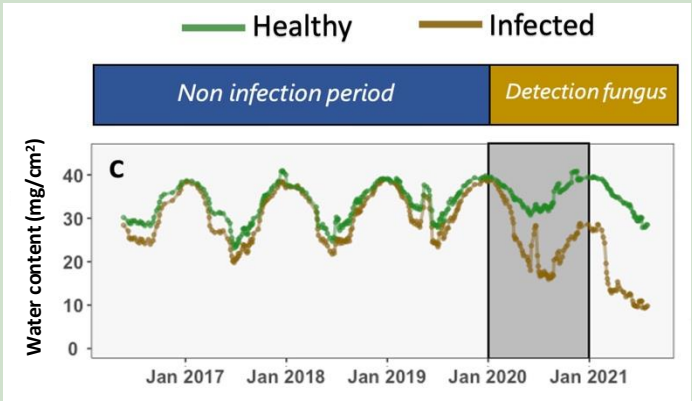
Forest (model tested on sites of the ICOS and eLTER infrastructure

Gross Primary Production in European forest	Early fungus infection detection in pine forest









Jose Luis Pancorbo[1], Giandomenico De Luca[1], Federico Carotenuto[1], Lorenzo Genesio[1], Alessandro Montaghi[2], Beniamino Gioli[1]

[1]CNR-IBE, National Research Council of Italy, Institute of Bioeconomy, Via Madonna del Piano 10, 50145 Sesto Fiorentino, Italy

[2]CNR-IRET, National Research Council of Italy, Institute of Research on Terrestrial Ecosystems, Via Madonna del Piano 10, 50145 Sesto Fiorentino, Italy

joseluis.pancorbodeonate@cnr.it

THANKS!

IR0000032 – ITINERIS, Italian Integrated Environmental Research Infrastructures System (D.D. n. 130/2022 - CUP B53C22002150006) Funded by EU - Next Generation EU PNRR-Mission 4 "Education and Research" - Component 2: "From research to business" - Investment 3.1: "Fund for the realisation of an integrated system of research and innovation infrastructures"

Finanziato dall'Unione europea NextGenerationEU

Ministero dell'Università e della Ricerca

Italiadomani