

Supplementary material

Manuscript title: Multi-Source Remote Sensing for large-scale biomass estimation in mediterranean olive orchards using GEDI LiDAR and Machine Learning

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Table : Statistics for RFR trained models, including R-squared (R²), Root Mean Square Error (RMSE), Mean Absolute Error (MAE), and the six most important features for each model, expressed on a per-unit basis.

Model Tested	AGBD predictions (GEDI L4A)					GEDI AGBD modelled (GEDI L2A)				
	R ²	RMSE	MAE	Feature importance		R ²	RMSE	MAE	Feature importance	
Optical bands	0.30	11.56	8.76	1) B4	0.41	0.45	7.17	5.07	1) B7	0.52
				2) B1	0.20				2) B5	0.15
				3) B5	0.09				3) B4	0.13
				4) B9	0.08				4) B6	0.05
				5) B7	0.07				5) B1	0.04
				6) B6	0.06				6) B3	0.03
Spectral indexes	0.24	12.01	9.26	1) GLI	0.56	0.45	7.19	5.02	1) NDWI	0.36
				2) GI	0.14				2) NDVI	0.28
				3) NDBI	0.07				3) MCARI1	0.09
				4) MCARI1	0.06				4) GLI	0.08
				5) GNDBI	0.06				5) GI	0.05
				6) EVI	0.04				6) SAVI	0.05
SAR polarization, textures, and RVI	0.17	12.54	10.24	1) HV	0.38	0.25	8.38	6.18	1) HV	0.47
				2) HV Inertia	0.14				2) RVI	0.08
				3) HV Contrast	0.14				3) HV Inertia	0.07
				4) HV Entropy	0.05				4) HV Contrast	0.06
				5) HH Entropy	0.04				5) HV Entropy	0.05
				6) HV Correlation	0.04				6) HV Correlation	0.05
Optical bands, SAR textures, and RVI	0.33	11.27	8.79	1) B4	0.32	0.50	6.89	4.87	1) B7	0.45
				2) B1	0.13				2) B5	0.12
				3) HV Contrast	0.11				3) B4	0.10
				4) HV Inertia	0.10				4) HV Contrast	0.04
				5) B9	0.05				5) HV Inertia	0.03
				6) B5	0.04				6) B6	0.03
Optical bands and SAR polarization	0.31	11.39	8.78	1) B4	0.38	0.48	6.97	4.88	1) B7	0.47
				2) HV	0.18				2) B5	0.12
				3) B1	0.12				3) B4	0.11
				4) B5	0.08				4) HV	0.11
				5) B9	0.06				5) HH	0.05

				6) <i>HH</i>	0.05				6) <i>B6</i>	0.04
SAR polarization, textures, RVI, and Topographic data	0.46	10.11	6.67	1) <i>Slope</i> 2) <i>Elevation</i> 3) <i>HV</i> 4) <i>HV Contrast</i> 5) <i>HV Inertia</i> 6) <i>HH</i>	0.38 0.32 0.10 0.03 0.03 0.02	0.41	7.48	5.46	1) <i>HV</i> 2) <i>Slope</i> 3) <i>Elevation</i> 4) <i>Aspect</i> 5) <i>RVI</i> 6) <i>HH</i>	0.34 0.26 0.09 0.05 0.03 0.03
Optical bands and Topographic data	0.54	9.33	6.04	1) <i>Slope</i> 2) <i>Elevation</i> 3) <i>B1</i> 4) <i>B7</i> 5) <i>B2</i> 6) <i>B9</i>	0.35 0.30 0.12 0.06 0.05 0.03	0.59	6.19	4.38	1) <i>B7</i> 2) <i>Slope</i> 3) <i>B4</i> 4) <i>B5</i> 5) <i>Elevation</i> 6) <i>B6</i>	0.39 0.21 0.11 0.11 0.04 0.03
Fully Multi-Source	0.56	9.09	5.86	1) <i>Slope</i> 2) <i>Elevation</i> 3) <i>B1</i> 4) <i>B2</i> 5) <i>HV</i> 6) <i>B7</i>	0.30 0.27 0.09 0.03 0.03 0.03	0.62	5.95	4.13	1) <i>NDWI</i> 2) <i>Slope</i> 3) <i>NDVI</i> 4) <i>SAVI</i> 5) <i>MCARI1</i> 6) <i>HV</i>	0.23 0.22 0.19 0.04 0.04 0.03