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Table S1 Common lidar processing issues by region and lidar survey. The tool and parameters used to rectify the observed issues are also provided.

Operation type	Region (lidar survey number)	Extension	Tool	Parameteres
Reclassification of ground returns	Cantabria (1º), La Rioja (1º)	Partial	MCC	"-s 2 -t 0.3"
Reclassification of ground returns	Catalonia (2º)	Region	lasground_new	"-step 30"
Reclassification of ground returns	Navarra (1º)	Region	lasground_new	"-step 30 -sub 2"
Reduction of class point density for vegetation class 3.	Murcia (1º), La Rioja (1º)	Region	lasthin	"-random -step 5"
Change of coordinate system	Andalusia (1º, 2º), Aragon (1º, 2º), Asturias (1º, 2º), Extremadura (1º, 2º), Valencia (2º)	Partial	las2las	"-target_epsg 25830"

Table S2 Estimation errors for forest height (98th percentile) and forest canopy cover (FCC) derived from Airborne Laser Scanning (ALS) compared to in-situ measurements from the 4th National Forest Inventory (FNI).

Region	Height				FCC				Temporal difference[1]	N	Year	
	R^2	RMSE (m)	rRMSE (%)	ME (m)	R^2	RMSE (m)	rRMSE (%)	ME (m)			FNI	ALS
Aragon	0.82	2.4	17.1	0.4	0.39	29.7	45.8	25.6	0	1828	2021	2021
Aragon	0.87	1.8	16.3	0.1	0.37	27.9	47.3	22.4	1	1047	2021	2020
Aragon	0.81	2.5	24.0	-0.2	0.31	28.7	50.6	20.0	5	988	2021	2016
Aragon	0.82	2.2	20.3	0.4	0.24	29.8	56.5	20.9	6	122	2022	2016
Asturias	0.60	4.6	23.0	1.5	0.09	36.2	55.1	27.2	2	1308	2010	2012
Asturias	0.60	4.7	23.6	1.3	0.10	35.5	54.4	26.9	3	958	2009	2012
Cantabria	0.75	3.7	21.7	0.9	0.25	26.3	34.8	21.2	0	177	2010	2010
Cantabria	0.84	3.1	17.9	0.0	0.20	30.2	42.0	22.7	1	199	2009	2010
Cantabria	0.30	7.7	39.4	-2.5	0.02	36.8	54.6	17.7	2	741	2010	2012
Cantabria	0.33	7.8	37.9	-2.9	0.04	36.9	54.9	17.3	3	526	2009	2012
C. la Mancha	0.87	1.7	16.6	0.1	0.34	32.9	68.4	26.8	0	1531	2020	2020
C. la Mancha	0.89	1.8	16.7	0.2	0.32	31.9	60.5	25.6	1	749	2019	2020
C. la Mancha	0.88	1.9	13.8	0.0	0.35	29.0	51.0	23.3	2	2271	2020	2018
C. la Mancha	0.88	1.7	16.2	-0.2	0.34	26.1	49.0	18.0	3	1417	2020	2017
C. la Mancha	0.83	1.8	14.8	-0.1	0.36	28.0	53.7	21.9	4	865	2020	2016
C. and Leon	0.94	2.0	16.0	-0.4	0.27	29.4	51.5	22.6	0	692	2019	2019
C. and Leon	0.91	2.1	14.9	-0.6	0.22	30.1	54.1	23.0	1	2004	2019	2018
C. and Leon	0.62	4.1	29.9	-0.1	0.21	28.9	46.1	20.8	2	2889	2019	2021
Catalonia	0.62	3.8	24.5	0.8	0.23	24.9	33.0	20.7	0	671	2016	2016
Catalonia	0.70	3.4	24.6	0.7	0.29	26.9	38.8	21.7	1	1469	2016	2017
Catalonia3	0.04	25.6	172.9	1.3	0.26	28.0	39.5	23.5	2	1470	2015	2017
Catalonia	0.75	2.7	15.3	0.5	0.15	27.0	36.6	22.7	3	313	2014	2017
Basque Ctr.	0.79	4.0	18.4	-0.3	0.12	23.4	30.2	14.0	1	1382	2011	2012
Extremadura	0.82	2.1	18.9	0.1	0.19	29.5	57.9	19.6	1	969	2017	2018
Extremadura	0.69	3.0	25.1	-0.1	0.03	31.9	58.0	12.2	2	1063	2017	2019
Extremadura	0.77	2.3	20.6	0.1	0.12	33.6	72.3	21.8	3	331	2016	2019
Galicia	0.65	5.0	24.7	-1.5	0.11	32.1	50.7	10.6	0	4015	2009	2009
Galicia	0.37	9.4	39.8	-4.3	0.01	42.6	67.8	-31.3	2	2718	2009	2011
Galicia	0.32	10.4	44.0	-5.0	0.01	43.3	71.6	-32.1	3	860	2008	2011
La Rioja	0.83	2.5	15.0	0.0	0.25	28.3	38.8	23.6	1	559	2011	2010
La Rioja	0.85	2.8	18.6	-0.2	0.16	31.4	45.7	25.2	2	657	2012	2010
Madrid	0.87	2.1	16.0	-0.4	0.36	33.3	58.7	27.8	2	847	2012	2010
Madrid	0.85	1.8	17.2	-0.2	0.31	36.3	73.6	31.1	3	319	2013	2010
Murcia	0.57	2.2	21.8	0.3	0.36	27.8	55.0	22.5	1	1280	2010	2009
Navarra	0.96	1.8	10.0	0.8	0.52	27.6	42.2	21.3	2	113	2008	2010
Navarra	0.85	3.1	16.7	-0.4	0.05	24.7	32.5	8.4	3	1222	2008	2011
Navarra	0.82	3.3	14.6	0.0	0.13	26.0	34.0	19.3	4	828	2008	2012

[1] years between in-situ data collection and lidar survey.

Table S3 Average forest height (50th and 98th percentile) and canopy cover (FCC) by region for the first and second national lidar surveys. Standard deviation within parenthesis.

		1st lidar survey				2nd lidar survey		
Region	**Year**	**P50 (m)**	**P98 (m)**	**FCC (%)**	**year**	**P50 (m)**	**P98 (m)**	**FCC (%)**
Andalusia	2014	4.4 (3.5)	5.9 (4.7)	33.3 (30.5)	2020	4.6 (3.5)	6.5 (4.8)	33.6 (30.2)
Aragon	2010	4.4 (3.5)	6.2 (4.9)	37.4 (33.1)	2016	4.9 (3.5)	7.3 (5.1)	45.3 (34.3)
Asturias	2012	9.2 (6.1)	13.5 (7.8)	61.9 (36)	2020	9.5 (6.1)	14.6 (7.9)	61.4 (34.1)
Basque Ctr.	2012	11 (6.7)	15.7 (8.4)	67.8 (32.6)	2017	12.2 (7)	17.3 (8.7)	74.6 (30.1)
Castile and Leon	2010	4.9 (4.4)	6.5 (5.7)	37.9 (35.1)	2021	6 (4.7)	8.5 (6.1)	48.2 (34.6)
Castile la Mancha	2009	3.7 (3.3)	5 (4.5)	28.2 (29.3)	2020	4.2 (3.3)	6 (4.8)	32.9 (29.7)
Cantabria	2012	7.9 (6.5)	10.7 (8.2)	54.6 (39.5)	2018	9.9 (6.5)	14.4 (8.2)	63 (34.6)
Catalonia	2009	6.4 (4)	9.3 (5.5)	63.6 (33.4)	2016	7 (4.5)	10.1 (6.5)	62.7 (33)
Extremadura	2010	3.5 (3.1)	4.4 (3.9)	22.6 (26)	2018	3.8 (3)	5 (4)	24.3 (25.9)
Galicia	2009	6.4 (6.6)	8.7 (8.3)	25.9 (31.2)	2015	9.1 (6.2)	13.5 (8.5)	60 (34.8)
La Rioja	2010	7.1 (5.5)	9.7 (6.9)	62.1 (38)	2016	7.6 (5.6)	10.7 (7.1)	60.8 (37.4)
Madrid	2010	4.6 (3.9)	6 (5.1)	35.8 (33.2)	2016	5.1 (4.1)	6.7 (5.3)	36.2 (32.7)
Murcia	2009	3.5 (2.9)	4.9 (4)	27.5 (27.6)	2016	3.9 (3)	5.4 (4.2)	26.7 (25.8)
Navarra	2012	9.2 (7)	12.5 (8.4)	57.8 (35.4)	2017	10.1 (7)	13.8 (8.4)	64 (33.7)
Valencia	2009	4.4 (9.6)	6.3 (15.7)	27.3 (27.8)	2015	4.6 (3.2)	7 (4.7)	37.4 (30.4)

Table S4 Average and total biomass by region as derived from the lidar survey closest to the national forest inventory (NFI) data collection. Modelling error for the selected cartographic error are also provided.

		Above ground biomass statistics				Model and model accuracy[6]				
Region	**Year**	**Total[3] (million t)**	**Mean (t ha^{-1})**	**StDev (t ha^{-1})**	**Area (ha 10^{-6})**	**Model[4]**	**R^2**	**MAE (t ha^{-1})**	**RMSE (t ha^{-1})**	**rRMSE (%)**
Aragon	2016	82.31	49.7	50.5	1.66	XGB	0.74	22.2	34.7	69.8
Asturias	2012	33.35	74.0	52.2	0.11	XGB	0.56	33.4	44.1	59.7
Basque Ctr.	2012	50.18	139.2	74.8	0.36	XGB	0.64	42.7	55.5	39.8
Cantabria	2012	25.58	123.4	75.2	0.21	XGB	0.57	44.8	73.4	59.5
Castile and Leon	2021	164.13	67.1	56.9	2.44	XGB	0.65	27.9	44.1	65.7
Castile la Mancha	2020	106.20	36.0	32.1	2.95	RF5	0.71	16.8	23.7	65.8
Catalonia	2016	120.36	77.0	53.4	1.56	XGB	0.74	26.6	37.4	48.6
Extremadura	2018	76.75	38.9	25.0	1.97	XGB	0.62	18.9	25.8	66.2
Galicia (east1)	2009	90.32	87.9	62.5	1.03	RF	0.49	41.2	57.3	65.2
Galicia (west2)	2015	76.62	86.4	51.8	0.89	RF	0.37	47.2	61.9	71.7
La Rioja	2016	18.63	108.2	69.9	0.17	XGB	0.61	40.0	56.4	52.1
Madrid	2010	13.55	51.3	47.1	0.26	RF	0.77	23.0	31.7	61.9
Murcia	2009	6.14	20.4	15.2	0.30	XGB	0.64	8.2	11.5	56.5
Navarra	2012	54.50	125.7	81.5	0.43	XGB	0.65	43.6	63.2	50.3

[1] east-central part; [2] west-central part; [3]computed for modelled forest pixels according to the latest forest map and valid lidar pixels (sea Area column); [4]XGB - eXtreme gradient boosting, RF- Random Forests; [6]computed from out of bag samples, average of 15 independent iterations, R^2 between observed and predicted values, MAE – mean absolute error, RMSE – root mean squared error.

Table S5 Differences between forest height (98th percentile) estimated from the second Spanish national lidar survey and regional and global cartographic products {Potapov, 2021 #1930; Lang, 2023 #1946; Tolan, 2024 #1996; Su, 2025 #1997}. Comparisons for regions with lidar surveys within one year of the global cartographic product. For the regional product (Su et al., 2025) the comparisons were carried out with contemporaneously acquired lidar data (i.e., same year).

Database	**Potapov et al. (2021) global**						**Lang et al. (2024) global**					
Region	**N**	**R^2**	**MAE**	**RMSE**	**rRMSE**	**ME**	**N**	**R^2**	**MAE**	**RMSE**	**rRMSE**	**ME**
Andalusia	8162	0.20	3.65	4.94	59.2	-2.7	10495	0.29	4.52	5.49	65.9	1.5
Aragon	2009	0.21	3.08	4.12	49.1	-1.1	12277	0.44	5.76	6.69	74.8	5.2
Asturias	6214	0.15	5.81	7.41	47.4	-1.7	18485	0.20	7.8	9.29	60.8	6.7
Cantabria	17514	0.19	5.73	7.28	47.4	-0.4	4123	0.35	7.02	8.27	55.3	5.9
C. la Mancha	10815	0.28	3.16	4.30	55.6	-2.2	6344	0.30	4.37	5.06	77.6	3.1
C. Leon	2548	0.37	3.81	5.19	56.4	-2.8	4918	0.38	5.65	6.60	71.0	4.8
Extremadura	12394	0.19	2.87	3.82	55.9	-2.0	3362	0.22	3.71	4.42	62.4	0.49
	Tolan et al. (2024) global						**Su et al. (2025) Iberian Peninsula**					
Andalusia	5676	0.21	5.44	6.63	70.1	-5.0	15597	0.62	2.04	2.92	37.6	-1.3
Aragon	1570	0.28	4.35	5.29	56.4	-3.1	15925	0.71	1.91	2.66	32.0	-0.5
Asturias	5396	0.24	6.50	8.23	49.5	-5.0	17468	0.53	3.74	4.94	32.5	0.4
Cantabria	15433	0.31	6.53	8.29	50.6	-5.4	18802	0.65	3.37	4.45	29.7	-1.0
C. la Mancha	8022	0.33	4.71	5.72	64.4	-4.3	15509	0.72	1.63	2.29	31.8	-0.6
C. Leon	2063	0.32	5.74	7.24	68.3	-5.4	12475	0.77	1.9	2.72	28.6	-0.3
Extremadura	8022	0.32	4.42	5.16	65.0	-4.0	14172	0.65	1.61	2.22	33.0	-1.0

Table S6 Repository links to above ground biomass, forest canopy cover and forest height generated from the first and second national lidar surveys across peninsular Spain.

Seq	Data description	Repository link	Resolution	CRS	File format	Size
1	Regional above ground biomass maps across Peninsular Spain	10.5281/zenodo.16794475	30 m	32630	Geotiff	1.5 GB
2	Regional forest canopy cover maps across Peninsular Spain for first and second lidar survey	10.5281/zenodo.16794418	10 m	25829 25830 25831	Geotiff	19.6 GB
3	Regional forest height maps (P50 and P98) across Peninsular Spain for first and second lidar survey	10.5281/zenodo.16794490 (P50) 10.5281/zenodo.16794688 (P98)	10 m	25829 25830 25831	Geotiff	22.4 GB 23.0 GB