

Supplementary Materials

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Table S1. Sentinel-2 image acquisition dates are shown in grey. Dates highlighted in black indicate Sentinel-2 images that are available for the LAI observation location, after pixel-level quality control.

Tile	Sentinel-2A		Sentinel-2B	
52SBB	8 February 2023	28 February 2023	4 January 2023	7 January 2023
	10 March 2023	13 March 2023	26 February 2023	28 March 2023
	2 April 2023	9 April 2023	7 April 2023	14 May 2023
	12 April 2023	22 April 2023	3 June 2023	2 August 2023
	9 May 2023	18 July 2023	5 August 2023	12 August 2023
	20 August 2023	6 September 2023	15 August 2023	25 August 2023
	9 September 2023	26 September 2023	11 September 2023	21 September 2023
	29 September 2023	16 October 2023	1 October 2023	4 October 2023
	19 October 2023	26 October 2023	21 October 2023	31 October 2023
	29 October 2023		3 November 2023	20 November 2023
			23 November 2023	
52SBD	12 January 2023	14 February 2023	10 January 2023	30 January 2023
	3 March 2023	6 March 2023	26 February 2023	18 March 2023
	13 March 2023	16 March 2023	21 March 2023	31 March 2023
	26 March 2023	2 April 2023	10 April 2023	20 April 2023
	12 April 2023	2 May 2023	27 April 2023	30 April 2023
	25 May 2023	3 August 2023	5 August 2023	18 August 2023
	13 August 2023	20 August 2023	25 August 2023	7 September 2023
	9 September 2023	12 October 2023	17 October 2023	27 October 2023
	1 November 2023	21 November 2023	23 November 2023	
52SBF	2 January 2023	12 January 2023	7 January 2023	10 January 2023
	1 February 2023	4 February 2023	20 January 2023	30 January 2023
	14 February 2023	21 February 2023	19 February 2023	26 February 2023
	24 February 2023	3 March 2023	18 March 2023	21 March 2023
	6 March 2023	13 March 2023	31 March 2023	10 April 2023
	16 March 2023	26 March 2023	30 April 2023	6 June 2023
	2 April 2023	12 April 2023	16 June 2023	19 July 2023
	15 May 2023	24 June 2023	26 July 2023	5 August 2023
	21 July 2023	13 August 2023	8 August 2023	18 August 2023
	2 September 2023	9 September 2023	25 August 2023	7 September 2023
	2 October 2023	29 October 2023	17 October 2023	27 October 2023
	1 November 2023	21 November 2023	23 November 2023	
52SCD	12 January 2023	19 January 2023	4 January 2023	17 January 2023
	29 January 2023	1 February 2023	26 February 2023	5 March 2023
	8 February 2023	21 February 2023	28 March 2023	27 April 2023
	28 February 2023	3 March 2023	14 May 2023	3 June 2023
	10 March 2023	13 March 2023	2 August 2023	5 August 2023
	2 April 2023	9 April 2023	15 August 2023	1 October 2023
	12 April 2023	9 May 2023	11 October 2023	21 October 2023
	7 August 2023	20 August 2023	31 October 2023	3 November 2023
	6 September 2023	9 September 2023	13 November 2023	20 November 2023
	29 September 2023	16 October 2023	23 November 2023	30 November 2023
	29 October 2023	8 November 2023		
	15 November 2023	25 November 2023		
	28 November 2023			
52SCE	2 January 2023	12 January 2023	4 January 2023	23 February 2023
	19 January 2023	1 February 2023	26 February 2023	5 March 2023
	8 February 2023	28 February 2023	17 April 2023	27 April 2023
	3 March 2023	10 March 2023	14 May 2023	6 June 2023
	13 March 2023	20 March 2023	16 June 2023	23 June 2023
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	22 April 2023	9 May 2023	11 October 2023	31 October 2023
	18 June 2023	21 July 2023	13 November 2023	20 November 2023
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	29 October 2023	15 November 2023		

	25 November 2023			
52SCF	2 January 2023 19 January 2023 8 February 2023 28 February 2023 10 March 2023 20 March 2023 9 April 2023 19 April 2023 9 May 2023 9 September 2023 26 October 2023 15 November 2023 28 November 2023	12 January 2023 1 February 2023 21 February 2023 3 March 2023 13 March 2023 2 April 2023 12 April 2023 22 April 2023 21 July 2023 6 October 2023 29 October 2023 25 November 2023	23 February 2023 5 March 2023 17 April 2023 3 June 2023 16 June 2023 1 October 2023 13 November 2023 23 November 2023	26 February 2023 15 March 2023 14 May 2023 6 June 2023 15 August 2023 31 October 2023 20 November 2023 30 November 2023
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	13 March 2023 2 April 2023 12 April 2023 9 May 2023 28 July 2023 29 October 2023 18 November 2023 28 November 2023	30 March 2023 9 April 2023 19 April 2023 1 July 2023 9 September 2023 15 November 2023 25 November 2023	17 April 2023 3 June 2023 25 August 2023 31 October 2023 20 November 2023 30 November 2023	27 April 2023 16 June 2023 24 September 2023 13 November 2023 23 November 2023
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52SEF	19 January 2023 8 February 2023 10 March 2023 9 May 2023 6 October 2023 26 October 2023 25 November 2023	29 January 2023 28 February 2023 9 April 2023 28 June 2023 16 October 2023 15 November 2023	4 January 2023 5 March 2023 3 June 2023 1 October 2023 20 November 2023	23 February 2023 15 March 2023 22 August 2023 31 October 2023 30 November 2023
52SEG	2 January 2023 29 January 2023 8 February 2023 3 March 2023 30 March 2023 9 April 2023 19 April 2023 11 June 2023 28 July 2023 6 October 2023 29 October 2023 18 November 2023	12 January 2023 1 February 2023 21 February 2023 13 March 2023 2 April 2023 12 April 2023 9 May 2023 28 June 2023 9 September 2023 26 October 2023 15 November 2023 28 November 2023	4 January 2023 27 January 2023 23 February 2023 5 March 2023 28 March 2023 27 April 2023 3 June 2023 5 August 2023 25 August 2023 31 October 2023 13 November 2023 23 November 2023	7 January 2023 16 February 2023 26 February 2023 18 March 2023 7 April 2023 14 May 2023 16 June 2023 22 August 2023 1 October 2023 3 November 2023 20 November 2023

Table S2. Relationship between LAI and Sentinel-based f_{esc} and NIRv across different forest types without topographic correction. Five forest types—deciduous broadleaf forest (DBF), deciduous needleleaf forest (DNF), evergreen broadleaf forest (EBF), evergreen needleleaf forest (ENF), and mixed forest (MF). ******* denotes statistically highly significant (p-value < 0.001), and ****** indicates statistically significant (p-value < 0.05).

(a) Relationship between SNAP LAI (x-axis) and Sentinel-based f_{esc} (y-axis)

Forest Type	Slope	Intercept	R ²
DBF**	0.03	0.23	0.35
DNF**	0.10	-0.04	0.61
EBF**	0.04	0.20	0.40
ENF**	-0.10	0.30	0.61
MF**	0.04	0.18	0.65

(b) Relationship between field-based LAI (x-axis) and Sentinel-based f_{esc} (y-axis)

Forest Type	Slope	Intercept	R ²
DBF**	0.03	0.23	0.14
DNF**	0.05	0.20	0.00
EBF**	0.04	0.23	0.22
ENF**	0.08	0.06	0.96
MF**	0.01	0.25	0.01

(c) Relationship between SNAP LAI (x-axis) and Sentinel-based NIRv (y-axis)

Forest Type	Slope	Intercept	R ²
DBF**	0.07	0.03	0.92
DNF**	0.11	-0.14	0.76
EBF**	0.05	0.11	0.71
ENF**	0.03	0.06	0.38
MF**	0.07	0.03	0.97

(d) Relationship between field-based LAI (x-axis) and Sentinel-based NIRv (y-axis)

Forest Type	Slope	Intercept	R ²
DBF**	0.09	0.00	0.55
DNF**	0.20	-0.23	0.05
EBF**	0.03	0.22	0.13
ENF**	0.01	0.08	0.04
MF**	0.03	0.12	0.06

Table S3. Relationship between LAI and Sentinel-based f_{esc} and NIRv on different forest types with topographic correction. Five forest types—deciduous broadleaf forest (DBF), deciduous needleleaf forest (DNF), evergreen broadleaf forest (EBF), evergreen needleleaf forest (ENF), and mixed forest (MF). ‘***’ denotes statistically highly significant (p-value < 0.001), and ‘**’ indicates statistically significant (p-value < 0.05).

(a) Relationship between SNAP LAI (x-axis) and Sentinel-based f_{esc} (y-axis)

Forest Type	Slope	Intercept	R ²
DBF**	0.03	0.23	0.24
DNF**	0.12	-0.07	0.59
EBF**	0.04	0.20	0.38
ENF**	-0.08	0.25	0.58
MF**	0.04	0.17	0.59

(b) Relationship between field-based LAI (x-axis) and Sentinel-based f_{esc} (y-axis)

Forest Type	Slope	Intercept	R ²
DBF**	0.03	0.23	0.09
DNF**	0.04	0.23	0.00
EBF**	0.04	0.23	0.22
ENF**	0.07	0.05	0.97
MF**	0.00	0.26	0.00

(c) Relationship between SNAP LAI (x-axis) and Sentinel-based NIRv (y-axis)

Forest Type	Slope	Intercept	R ²
DBF**	0.07	0.03	0.89
DNF**	0.12	-0.17	0.74
EBF**	0.05	0.12	0.69
ENF**	0.02	0.05	0.32
MF**	0.07	0.03	0.94

(d) Relationship between field-based LAI (x-axis) and Sentinel-based NIRv (y-axis)

Forest Type	Slope	Intercept	R ²
DBF**	0.09	0.00	0.53
DNF**	0.19	-0.21	0.04
EBF**	0.03	0.22	0.13
ENF**	0.01	0.07	0.08
MF**	0.02	0.12	0.04

Table S4. Relationship between CI and Sentinel-based f_{esc} and NIRv on different forest types without topographic correction. Five forest types—deciduous broadleaf forest (DBF), deciduous needleleaf forest (DNF), evergreen broadleaf forest (EBF), evergreen needleleaf forest (ENF), and mixed forest (MF). ‘***’ denotes statistically highly significant (p-value < 0.001), and ‘**’ indicates statistically significant (p-value < 0.05).

(a) Relationship between field-based CI (x-axis) and Sentinel-based f_{esc} (y-axis)

Forest Type	Slope	Intercept	R ²
DBF**	0.23	0.08	0.05
DNF**	-2.62	2.26	0.96
EBF**	-0.24	0.56	0.15
ENF**	-0.93	0.87	0.92
MF**	0.19	0.10	0.04

(b) Relationship between field-based CI (x-axis) and Sentinel-based NIRv (y-axis)

Forest Type	Slope	Intercept	R ²
DBF**	-0.06	0.19	0.00
DNF**	-2.62	2.19	1.00
EBF**	-0.20	0.48	0.11
ENF**	0.09	0.02	0.08
MF**	0.32	-0.10	0.07

Table S5. Relationship between CI and Sentinel-based f_{esc} and NIRv on different forest types with topographic correction. Five forest types—deciduous broadleaf forest (DBF), deciduous needleleaf forest (DNF), evergreen broadleaf forest (EBF), evergreen needleleaf forest (ENF), and mixed forest (MF). ‘***’ denotes statistically highly significant (p-value < 0.001), and ‘**’ indicates statistically significant (p-value < 0.05).

(a) Relationship between field-based (x-axis) and Sentinel-based f_{esc} (y-axis)

Forest Type	Slope	Intercept	R ²
DBF**	0.27	0.05	0.05
DNF**	-2.96	2.51	0.95
EBF**	-0.24	0.57	0.15
ENF**	-0.82	0.77	0.90
MF**	0.31	-0.01	0.09

(b) Relationship between field-based CI (x-axis) and Sentinel-based NIRv (y-axis)

Forest Type	Slope	Intercept	R ²
DBF**	-0.06	0.19	0.00
DNF**	-2.90	2.41	0.99
EBF**	-0.21	0.49	0.11
ENF**	0.06	0.03	0.05
MF**	0.38	-0.16	0.10

Table S6. Relationship between LAI×CI and Sentinel-based f_{esc} and NIRv on different forest types without topographic correction. Five forest types—deciduous broadleaf forest (DBF), deciduous needleleaf forest (DNF), evergreen broadleaf forest (EBF), evergreen needleleaf forest (ENF), and mixed forest (MF). ‘***’ denotes statistically highly significant (p-value < 0.001), and ‘**’ indicates statistically significant (p-value < 0.05).

(a) Relationship between field-based (x-axis) and Sentinel-based f_{esc} (y-axis)

Forest Type	Slope	Intercept	R ²
DBF**	0.05	0.22	0.19
DNF**	-0.76	1.75	0.66
EBF**	0.03	0.27	0.08
ENF*	0.13	0.04	0.91
MF**	0.02	0.24	0.02

(b) Relationship between field-based CI (x-axis) and Sentinel-based NIRv (y-axis)

Forest Type	Slope	Intercept	R ²
DBF**	0.11	-0.01	0.60
DNF**	-0.65	1.47	0.50
EBF**	0.02	0.25	0.03
ENF*	0.01	0.08	0.09
MF**	0.05	0.10	0.11

Table S7. Relationship between LAI×CI and Sentinel-based f_{esc} and NIRv on different forest types with topographic correction. Five forest types—deciduous broadleaf forest (DBF), deciduous needleleaf forest (DNF), evergreen broadleaf forest (EBF), evergreen needleleaf forest (ENF), and mixed forest (MF). ‘***’ denotes statistically highly significant (p-value < 0.001), and ‘**’ indicates statistically significant (p-value < 0.05).

(a) Relationship between field-based (x-axis) and Sentinel-based f_{esc} (y-axis)

Forest Type	Slope	Intercept	R ²
DBF**	0.04	0.22	0.12
DNF**	-0.87	1.96	0.68
EBF**	0.03	0.26	0.08
ENF**	0.12	0.03	0.93
MF**	0.01	0.24	0.01

(b) Relationship between field-based CI (x-axis) and Sentinel-based NIRv (y-axis)

Forest Type	Slope	Intercept	R ²
DBF**	0.11	-0.01	0.58
DNF**	-0.74	1.64	0.53
EBF**	0.02	0.25	0.04
ENF**	0.01	0.06	0.13
MF**	0.05	0.10	0.10