

Table S1. Vegetation Indices calculated and used in tree species classification.

Index	Name	Equation	Reference
BR	Blue Ratio	$\frac{663.54nm}{481.37nm} * \frac{546.95nm}{481.37nm} * \frac{721.84nm}{481.37nm} * \frac{831.14nm}{481.37nm}$	[1]
CAI	Cellulose Absorption Index	$0.5 * (2019nm + 2206nm) - 2109nm$	[2]
CF1	Chlorophyll fluorescence, R761-R757	$761 nm - 757 nm$	[3]
CF2	Chlorophyll fluorescence, R690/R630	$\frac{690 nm}{630 nm}$	[3]
CF3	Chlorophyll fluorescence, R761/R757	$\frac{761 nm}{757 nm}$	[3]
CI	Conifer Index	$\frac{751nm - 534nm}{751nm + 534nm}$	[4]
Cl _{green}	Chlorophyll Index Green	$\frac{788nm}{558nm} - 1$	[5]
Cl _{re}	Chlorophyll Index Red Edge	$\frac{788nm}{722nm} - 1$	[5]
CRI ₅₅₀	Carotenoid Reflectance Index1	$\frac{1}{510nm} - \frac{1}{550nm}$	[6]
CRI ₇₀₀	Carotenoid Reflectance Index2	$\frac{1}{510nm} - \frac{1}{700nm}$	[6]
EVI	Enhanced Vegetation Index	$2.5 * \frac{867.57nm - 648.97nm}{(867.57nm + 6 * 648.97nm - 7.5 * 466.79nm) + 1}$	[7]
GNDVI	Green Normalized Difference Vegetation Index	$\frac{750.98nm - 546.95nm}{750.98nm + 546.95nm}$	[8]
GR	Green Ratio	$\frac{546.95nm}{663.54nm}$	[1]
MCARI	Modified chlorophyll absorption in reflectance index	$[(700nm - 670nm) - 0.2 * (700nm - 550nm)] * (700nm - 670nm)$	[9]
MCARI1	Modified chlorophyll absorption in reflectance index1	$1.2 * (2.5 * (800nm - 670nm) - 1.3 * (800nm - 550nm))$	[10]
MCARI2	Modified chlorophyll absorption in reflectance index2	$\frac{1.5 * (2.5 * (800nm - 670nm) - 1.3 * (800nm - 550nm))}{\sqrt{(2 * 800nm + 1)^2 - (6 * 800nm - 5 * \sqrt{670nm})}}$	[10]
mND ₇₀₅	Modified Normalized Difference Index	$\frac{750 nm - 705 nm}{750 nm + 705nm - 2 * 445nm}$	[11]

MTCI	MERIS terrestrial chlorophyll index	$\frac{753.75nm - 708.75nm}{708.75nm + 681.25nm}$	[12]
NDLI	Normalized Difference Lignin Index	$\frac{\log(\frac{1}{1754nm}) - \log(\frac{1}{1680nm})}{\log(\frac{1}{1754nm}) + \log(\frac{1}{1680nm})}$	[13]
NDNI	Normalized Difference Nitrogen Index	$\frac{\log(\frac{1}{1510nm}) - \log(\frac{1}{1680nm})}{\log(\frac{1}{1510nm}) + \log(\frac{1}{1680nm})}$	[13]
NDRE	Normalized Difference Red Edge Index	$\frac{790nm - 720nm}{790nm + 720nm}$	[14]
NDVI	Normalized Difference Vegetation Index	$\frac{800nm - 670nm}{800nm + 670nm}$	[15]
NDWI	Normalized Difference Water Index	$\frac{860nm - 1240nm}{860nm + 1240nm}$	[16]
PRI	Photochemical Reflectance Index	$\frac{531nm - 570nm}{531nm + 570nm}$	[17]
PSI1	Plant stress index R695/R420	$\frac{695 nm}{420 nm}$	[18]
PSI2	Plant stress index R605/R760	$\frac{605 nm}{760 nm}$	[18]
PSI3	Plant stress index R695/R760	$\frac{695 nm}{760 nm}$	[18]
PSI4	Plant stress index R710/R760	$\frac{710 nm}{760 nm}$	[18]
PSND	Pigment Sensitive Normalized Difference	$\frac{800nm - 680nm}{800nm + 680nm}$	[19]
PSND2	Pigment Sensitive Normalized Difference 2	$\frac{800nm - 635nm}{800nm + 635nm}$	[19]
PSRI	Plant Senescence Reflectance Index	$\frac{678nm - 500nm}{750nm}$	[20]
PSSR	Pigment Specific Simple Ratio	$\frac{800nm}{680nm}$	[19]
PSSR2	Pigment Specific Simple Ratio 2	$\frac{800nm}{635nm}$	[19]
REIP	Red Edge Inflation Point	$700 + 40 \left(\frac{670 nm + 780 nm}{2} - 700 nm \right) / (740 nm - 700 nm)$	[21]
RENDVI	Red Edge Normalized Difference Vegetation Index	$\frac{750nm - 705nm}{750nm + 705nm}$	[8]
RR	Red Ratio	$\frac{831.14nm}{663.54nm} * \frac{546.95nm}{663.54nm} * \frac{831.14nm}{721.84nm}$	[1]

RVSI	Red-Edge Vegetation Stress Index	$\frac{714nm + 752nm}{2 - 733nm}$	[22]
RWP	Red Well Position	$670 + 30\left(\frac{\frac{670nm+780nm}{2} - 700nm}{740nm - 700nm}\right)$	[21]
SI	Spruce Index	$\frac{751nm - 715nm}{751nm + 715nm}$	[4]
SIPI	Structure-Insensitive Pigment Index	$\frac{800nm - 445nm}{800nm + 680nm}$	[23]
SIWSI	Shortwave infrared water stress index	$\frac{859nm - 1640nm}{859nm + 1640nm}$	[24]
SRWI	Simple Ratio Water Index	$\frac{858nm}{1240nm}$	[25]
TCARI/ OSAVI	Transformed Chlorophyll Ratio Index/Optimization of Soil-adjusted Vegetation Index	$\frac{3 * (750.66nm - 704.6nm) - 0.2 * (750.66nm - 550.67nm) * \frac{750.66nm}{704.6nm}}{(1 + 0.16) * (750.66 - 704.6) / (750.66 + 704.6 + 0.16)}$	[9,26]
VOG1	Vogelmann Index 1	$\frac{740.480nm}{721.520nm}$	[27]
WBI	Water Band Index	$\frac{970nm}{900nm}$	[28]

Table S2. Spectral variance of each principal component used in the analysis.

Principal Component	Spectral variance (%)				
1	0.733424541	47	6.17E-05	97	7.90E-06
2	0.101193229	48	6.03E-05	98	7.69E-06
3	0.079277231	49	5.52E-05	99	7.52E-06
4	0.028275502	50	5.41E-05	100	7.26E-06
5	0.017410613	51	5.09E-05	101	6.76E-06
6	0.008052092	52	4.84E-05	102	6.48E-06
7	0.00557642	53	4.79E-05	103	6.35E-06
8	0.003834948	54	4.75E-05	104	6.24E-06
9	0.003657565	55	4.58E-05	105	5.76E-06
10	0.003140772	56	4.18E-05	106	5.70E-06
11	0.002409257	57	3.98E-05	107	5.52E-06
12	0.001775957	58	3.64E-05	108	5.07E-06
13	0.001771961	59	3.51E-05	109	5.02E-06
14	0.001162961	60	3.45E-05	110	4.81E-06
15	0.00114785	61	3.21E-05		
16	0.00085279	62	3.00E-05		
17	0.000802317	63	2.86E-05		
18	0.000523554	64	2.70E-05		
19	0.000481042	65	2.67E-05		
20	0.000317236	66	2.46E-05		
21	0.000268142	67	2.39E-05		
22	0.000260903	68	2.34E-05		
23	0.000248778	69	2.10E-05		
24	0.00022868	70	2.02E-05		
25	0.000179743	71	1.92E-05		
26	0.000166136	72	1.83E-05		
27	0.000162626	73	1.80E-05		
28	0.000152263	74	1.71E-05		
29	0.000133389	75	1.70E-05		
30	0.00013281	76	1.61E-05		
31	0.000127287	77	1.51E-05		
32	0.000122028	78	1.47E-05		
33	0.000113652	79	1.44E-05		
34	0.000109681	80	1.37E-05		
35	0.000103511	81	1.31E-05		
36	9.97E-05	82	1.27E-05		
37	9.29E-05	83	1.22E-05		
38	8.94E-05	84	1.21E-05		
39	8.62E-05	85	1.15E-05		
40	7.93E-05	86	1.11E-05		
41	7.75E-05	87	1.05E-05		
42	7.44E-05	88	9.93E-06		
43	7.23E-05	89	9.71E-06		
44	6.93E-05	90	9.56E-06		
45	6.77E-05	91	9.20E-06		
46	6.28E-05	92	8.93E-06		

Table S3. Kappa and overall accuracy (OA) results for the classification with different principal component sets using support vector machine.

Principal Component	Kappa (VNIR+SWIR)	OA (VNIR+SWIR)	Principal Component	Kappa (VNIR+SWIR)	OA (VNIR+SWIR)
1	0.24	0.43	44	0.75	0.81
2	0.41	0.56	45	0.76	0.82
3	0.42	0.56	46	0.75	0.81
4	0.44	0.58	50	0.74	0.80
5	0.43	0.57	55	0.74	0.80
6	0.45	0.59	60	0.76	0.82
7	0.47	0.60	65	0.76	0.82
8	0.46	0.59	70	0.75	0.81
9	0.48	0.61	75	0.73	0.80
10	0.50	0.62	80	0.73	0.80
11	0.51	0.63	85	0.73	0.80
12	0.52	0.64	90	0.73	0.79
13	0.55	0.66	95	0.73	0.80
14	0.60	0.70	100	0.70	0.78
15	0.60	0.71	105	0.70	0.78
16	0.60	0.70	110	0.73	0.80
17	0.67	0.75			
18	0.68	0.76			
19	0.70	0.77			
20	0.70	0.78			
21	0.71	0.78			
22	0.71	0.79			
23	0.71	0.78			
24	0.71	0.78			
25	0.70	0.77			
26	0.72	0.79			
27	0.72	0.79			
28	0.72	0.79			
29	0.72	0.79			
30	0.71	0.78			
31	0.72	0.79			
32	0.72	0.79			
33	0.71	0.79			
34	0.72	0.79			
35	0.73	0.79			
36	0.74	0.81			
37	0.75	0.81			
38	0.76	0.82			
39	0.76	0.82			
40	0.76	0.82			
41	0.76	0.82			
42	0.76	0.82			
43	0.76	0.82			

Table S4. Statistical significance of the difference in overall accuracy between the 15 models compared using McNemar's test (significant differences >3.84 indicated with *). McNemar's test statistic values are on the left side of the diagonal, p-values on the right side. The models were trained with Random Forest (RF) and Support Vector Machines (SVM), using all features with and without Recursive Feature Elimination (RFE) and fitted with different feature sets (Refl. = VNIR + SWIR reflectance, VI = Vegetation Indices, PCA = Principal Component Analysis).

	Refl. (RF)	VI (RF)	Refl. + VI (RF)	PCA (RF)	PCA + VI (RF)	Refl. (SVM)	VI (SVM)	Refl. + VI (SVM)	PCA (SVM)	PCA + VI (SVM)	Refl. (RF + RFE)	VI (RF + RFE)	Refl. + VI (RF + RFE)	Refl. (SVM + RFE)	VI (SVM + RFE)	Refl. + VI (SVM + RFE)
Refl. (RF)		0	0	0	0	0	0	0	0	0	0.6	0	0	0	0	0
VI (RF)	27.57 *		0.83	0.02	0.02	0	0	0	0	0	0	0.61	0.66	0.02	0.02	0.01
Refl. + VI (RF)	30.81 *	0.04		0.02	0.03	0	0	0	0	0	0	0.57	0.61	0.02	0.02	0.01
PCA (RF)	47.64 *	5.44 *	5.13 *		0.69	0	0.23	0.07	0.35	0.31	0	0.06	0.07	0.35	0.34	0.22
PCA + VI (RF)	43.76 *	5.23 *	4.45 *	0.16		0	0.12	0.03	0.19	0.15	0	0.1	0.11	0.25	0.24	0.15
Refl. (SVM)	70.51 *	23.68 *	22.22 *	8.00 *	9.62 *		0.08	0.22	0.02	0.02	0	0	0	0.68	0.67	0.89
VI (SVM)	55.31 *	14.52 *	12.19 *	1.42	2.48	3.10		0.38	0.75	0.87	0	0.02	0.02	0.73	0.73	0.53
Refl. + VI (SVM)	58.84 *	15.91 *	14.10 *	3.38 *	4.90 *	1.50	0.76		0.25	0.26	0	0	0.01	1	1	0.78
PCA (SVM)	52.08 *	10.05 *	9.23 *	0.86	1.72	5.12 *	0.10	1.32		0.85	0	0.02	0.02	0.63	0.63	0.44
PCA + VI (SVM)	49.47 *	10.38 *	9.33 *	1.03	2.05	5.54 *	0.03	1.29	0.04		0	0.02	0.02	0.68	0.67	0.48
Refl. (RF + RFE)	0.27	8.73 *	9.12 *	18.28 *	16.44 *	31.4 *	23.37 *	27.35 *	22.37 *	23.40 *		0	0	0	0	0
VI (RF + RFE)	8.80 *	0.25	0.32	3.46	2.73	10.22 *	5.87 *	8.00 *	5.36 *	5.73 *	17.33 *		0.83	0	0	0
Refl. + VI (RF + RFE)	9.13 *	0.19	0.25	3.27	2.55	9.93 *	5.68 *	7.60 *	5.17 *	5.54 *	20.05 *	0.05		0	0	0
Refl. (SVM + RFE)	31.68 *	5.44 *	5.07 *	0.89	1.32	0.17	0.12	0.00	0.23	0.17	60.83 *	21.75 *	21.00 *		1	0.37
VI (SVM + RFE)	32.39 *	5.49 *	5.16 *	0.91	1.37	0.18	0.12	0.00	0.24	0.18	61.89 *	25.33 *	23.84 *	0.00		0.5

Refl. + VI (SVM + RFE)	34.98 *	6.88 *	6.45 *	1.50	2.05	0.02	0.40	0.08	0.59	0.50	61.46 *	25.99 *	25.19 *	0.80	0.44	
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