

Supplementary Information

Table S1 - Results from the preliminary analysis used to select the most important features for biomod2 image ensemble classification with the total 108 variables (X12 – December; X01 – January; X02 – February; X03 – March; X04 – April; X05 – May; the name suffix is Sentinel-2's band position).

Rank	Variables acronyms	Average variable importance	Importance std-deviation
1	X12_b12	0.1378	0.2061
2	X01_b2	0.1241	0.1093
3	X01_lai	0.1202	0.1838
4	X04_b3	0.0981	0.1316
5	X03_b3	0.0847	0.1620
6	X12_b11	0.0800	0.1313
7	X02_b9	0.0703	0.1339
8	X12_b1	0.0668	0.0844
9	X02_b12	0.0660	0.1326
10	X03_b1	0.0634	0.1179
11	X05_b3	0.0615	0.1272
12	X12_b3	0.0574	0.1041
13	X04_b21	0.0544	0.0656
14	X02_b3	0.0541	0.0863
15	X12_b4	0.0488	0.0752
16	X03_lai	0.0460	0.0906
17	X12_lai	0.0460	0.0974
18	X02_b5	0.0425	0.0786
19	X05_b9	0.0421	0.1079
20	X05_b2	0.0412	0.0836
21	X01_b12	0.0412	0.1024
22	X12_b9	0.0397	0.1178
23	X05_b8a	0.0378	0.0878
24	X03_b2	0.0350	0.0763
25	X01_b8	0.0344	0.1120
26	X01_b6	0.0336	0.0907
27	X03_b7	0.0336	0.0661
28	X01_b11	0.0336	0.0821
29	X02_mcari	0.0328	0.0449
30	X02_b6	0.0312	0.0710
31	X01_b8a	0.0303	0.1124
32	X12_evi	0.0298	0.1408
33	X05_evi	0.0294	0.0963
34	X03_b6	0.0294	0.0679

35	X04_b4	0.0284	0.0628
36	X05_b8	0.0277	0.0797
37	X05_1	0.0272	0.0642
38	X05_b6	0.0270	0.0618
39	X03_b9	0.0261	0.0898
40	X12_msavi	0.0256	0.0672
41	X02_ndvi	0.0254	0.1060
42	X04_b6	0.0250	0.0542
43	X02_b8a	0.0244	0.0821
44	X01_ndvi	0.0229	0.0792
45	X04_8a	0.0223	0.0614
46	X02_b11	0.0221	0.0510
47	X02_b7	0.0220	0.0724
48	X04_b5	0.0216	0.0492
49	X01_b9	0.0206	0.0703
50	X12_b8	0.0206	0.0630
51	X01_msavi2	0.0194	0.0575
52	X02_evi	0.0192	0.0753
53	X03_evi	0.0188	0.0900
54	X03_b11	0.0188	0.0589
55	X04_ndvi	0.0183	0.0909
56	X03_b12	0.0180	0.0688
57	X01_b5	0.0176	0.0500
58	X02_b4	0.0173	0.0570
59	X03_b8a	0.0172	0.0546
60	X01_b1	0.0169	0.0373
61	X04_lai	0.0157	0.0418
62	X04_b11	0.0157	0.0535
63	X05_b4	0.0146	0.0672
64	X03_b8	0.0136	0.0448
65	X12_ndvi	0.0135	0.0731
66	X01_mcari	0.0133	0.0310
67	X03_b5	0.0130	0.0527
68	X05_11	0.0128	0.0328
69	X01_evi	0.0126	0.0739
70	X01_b7	0.0125	0.0619
71	X04_b12	0.0121	0.0373
72	X02_msavi2	0.0120	0.0694
73	X02_lai	0.0120	0.0344
74	X12_b2	0.0119	0.0527
75	X01_b4	0.0118	0.0378

76	X04_msavi2	0.0113	0.0506
77	X12_b5	0.0112	0.0412
78	X05_b7	0.0111	0.0439
79	X04_b9	0.0111	0.0308
80	X03_b4	0.0104	0.0431
81	X05_b12	0.0103	0.0391
82	X05_ndvi	0.0102	0.0423
83	X05_lai	0.0101	0.0303
84	X12_mcari	0.0099	0.0307
85	X02_b8	0.0093	0.0377
86	X04_mtc	0.0088	0.0232
87	X04_b1	0.0085	0.0238
88	X03_mcari	0.0085	0.0282
89	X12_b6	0.0082	0.0332
90	X02_b1	0.0081	0.0272
91	X04_mcari	0.0078	0.0359
92	X04_b8	0.0077	0.0341
93	X01_mtc	0.0076	0.0184
94	X12_b8a	0.0073	0.0335
95	X02_b2	0.0071	0.0258
96	X04_b7	0.0066	0.0269
97	X03_mtc	0.0065	0.0139
98	X03_msavi2	0.0055	0.0194
99	X03_ndvi	0.0054	0.0283
100	X02_mtc	0.0050	0.0129
101	X12_b7	0.0048	0.0267
102	X12_mtc	0.0047	0.0158
103	X01_b3	0.0032	0.0106
104	X05_b5	0.0023	0.0114
105	X04_evi	0.0000	0.0000
106	x05_mtc	0.0000	0.0000
107	x05_msavi	0.0000	0.0000
108	x05_mcari	0.0000	0.0000

Table S2 - Performance evaluation scores from the preliminary analysis.

Performance statistic	Value	Cutoff	Sensitivity	Specificity
KAPPA	0.925	721	93.981	98.2
TSS	0.938	615	97.377	96.399
ROC	0.995	636.5	96.914	96.914

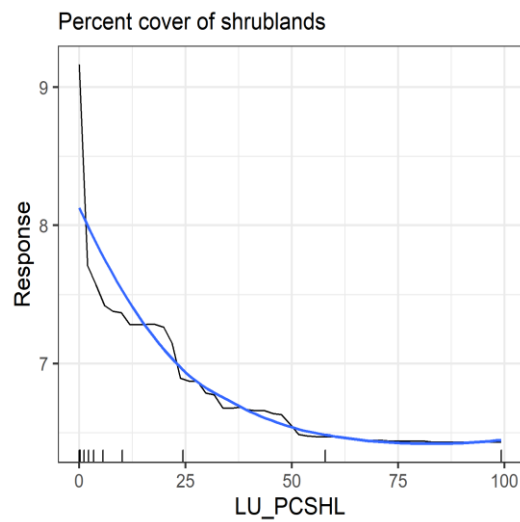
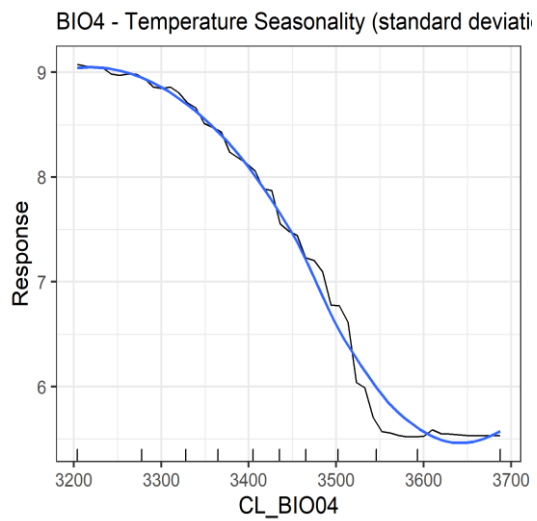
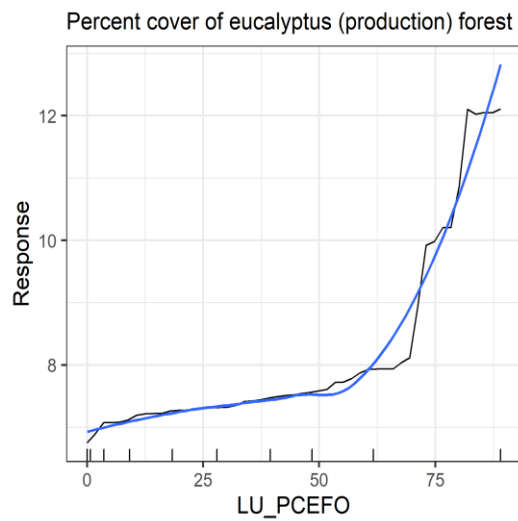
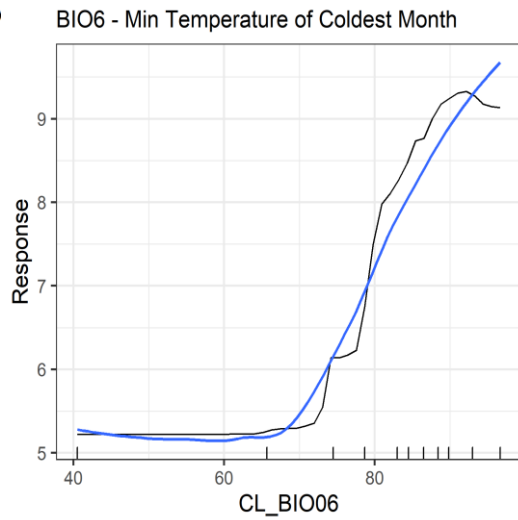
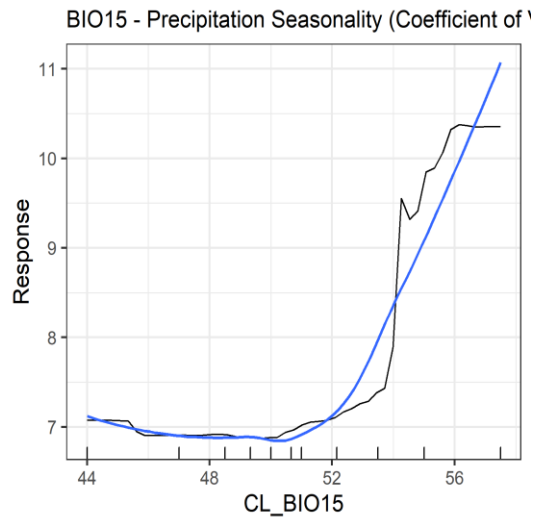
Table S3 – Average driver importance ranking for all variables tested (ordered in descendent fashion).

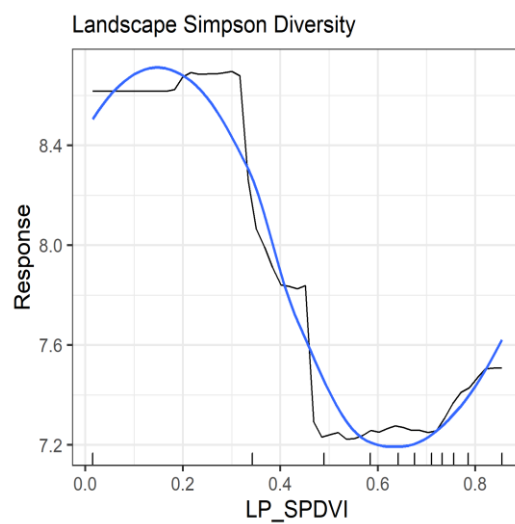
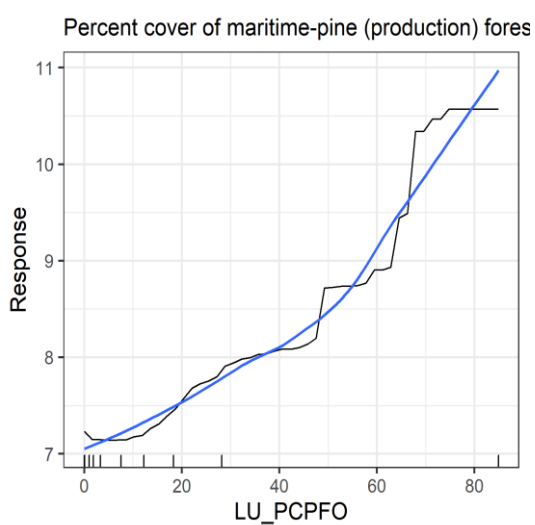
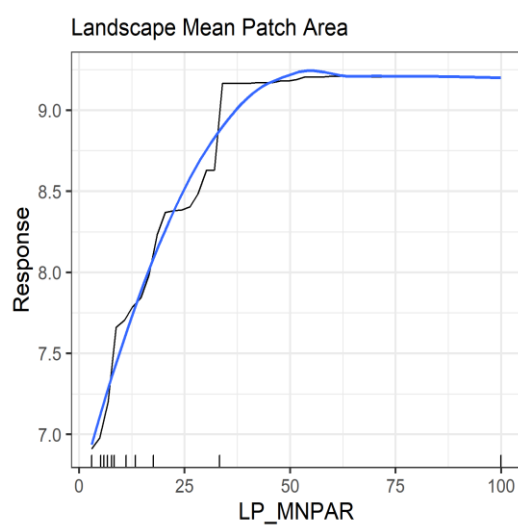
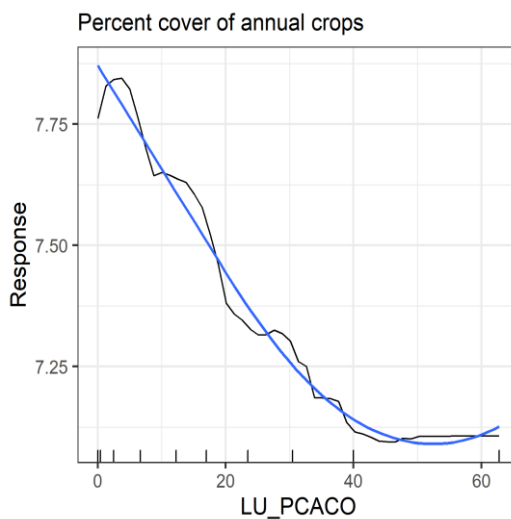
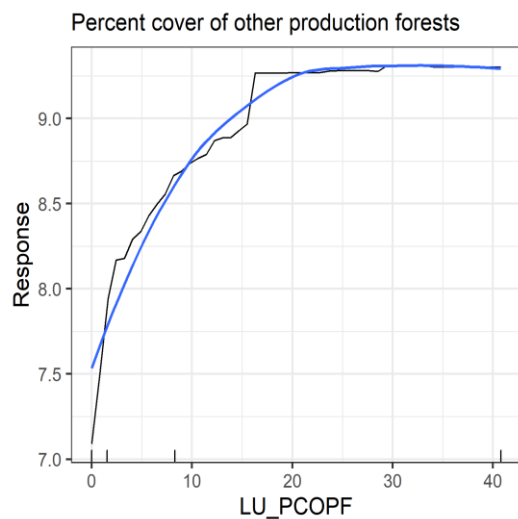
Variable type	Variable acronym	Description	Average Importance
Climate	CL_BIO06	BIO6 - Min Temperature of Coldest Month	854.3
Land use	LU_PCEFO	Percent cover of eucalyptus (production) forest	853.5
Climate	CL_BIO08	BIO8 - Mean Temperature of Wettest Quarter	831.5
Climate	CL_BIO04	BIO4 - Temperature Seasonality (standard deviation $\times 100$)	734.1
Climate	CL_BIO15	BIO15 - Precipitation Seasonality (Coefficient of Variation)	575.7
Land use	LU_PCSHL	Percent cover of shrublands	519.9
Land use	LU_PCOPF	Percent cover of other production forests	463.3
Landscape pattern / heterogeneity	LP_MNPAR	Landscape Mean Patch Area	370.0
Landscape pattern / heterogeneity	LP_SPDVI	Landscape Simpson Diversity	360.2
Land use	LU_PCPFO	Percent cover of maritime-pine (production) forest	338.5
Landscape pattern / heterogeneity	LP_SHDVI	Landscape Shannon Diversity	310.8
Topography / Geomorphology	TG_TOWTI	Topographic Wetness Index	294.6
Landscape pattern / heterogeneity	LP_PASTD	Landscape Patch Area Standard-deviation	271.3
Topography / Geomorphology	TG_SLOPE	Slope	258.9
Topography / Geomorphology	TG_TORGI	Topographic Rugdness Index	250.1
Land use	LU_PCACO	Percent cover of annual crops	243.2
Climate	CL_BIO18	BIO18 - Precipitation of Warmest Quarter	196.3
Climate	CL_BIO17	BIO17 - Precipitation of Driest Quarter	194.0
Disturbance	DT_BA20YR	Total Burnt Area (last 20 years)	190.3
Landscape pattern / heterogeneity	LP_LAPAI	Landscape Largest Patch Index	186.4
Disturbance	DT_BA10YR	Total Burnt Area (last 10 years)	161.8
Linear elements	LE_EDGDN	Landscape edge density	156.9
Disturbance	DT_BA5YR	Total Burnt Area (last 5 years)	151.5
Topography / Geomorphology	TG_RADAV	Average Solar Radiation	149.6
Soil properties	SO_PCLAY	Percent of clay in soils	143.8

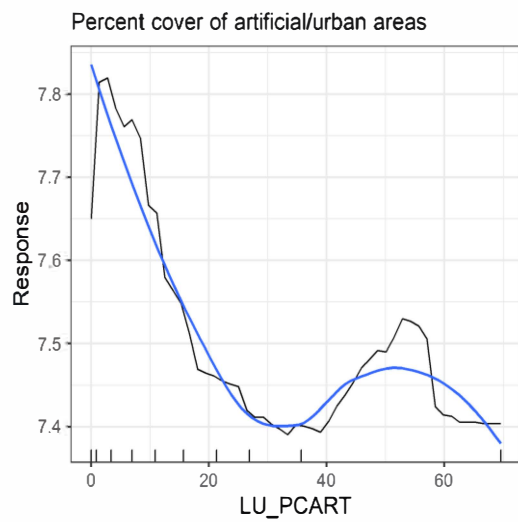
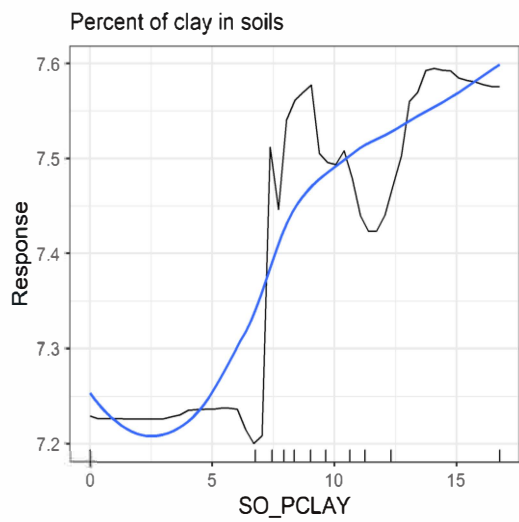
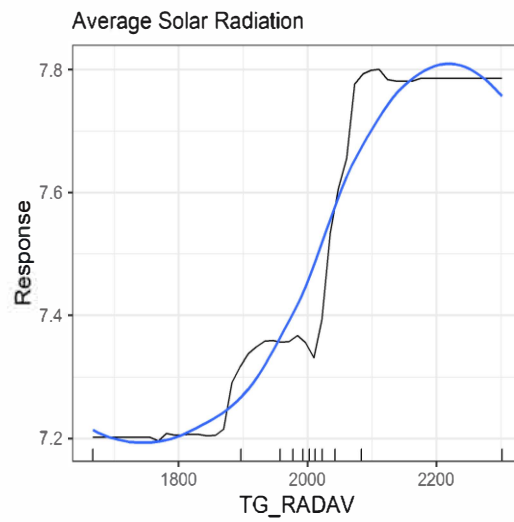
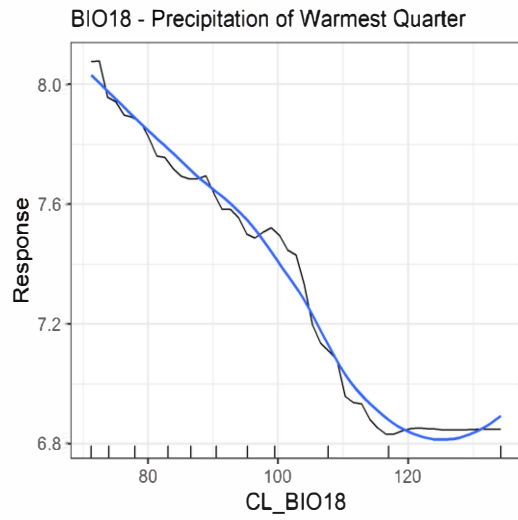
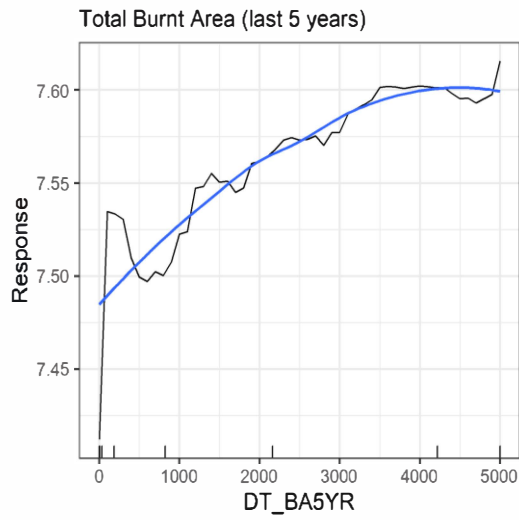
Land use	LU_PCART	Percent cover of artificial/urban areas	141.8
Soil properties	SO_BULKD	Bulk Density	139.9
Soil properties	SO_PSAND	Percent of sand in soils	131.5
Soil properties	SO_PSILT	Percent of silt in soils	130.4
Linear elements	LE_TLMTW	Total length of motorways	126.4
Landscape pattern / heterogeneity	LP_PACOV	Landscape Patch Area Coefficient of variation	123.5
Linear elements	LE_TLROD	Total length of all road types	115.5
Soil properties	SO_AVWTC	Available water content	110.3
Linear elements	LE_TLRIV	Total length of rivers	106.0
Land use	LU_PCRRL	Percent cover of roads and rails	105.4
Soil properties	SO_PCOAR	Percent of coarse elements in soils	95.3
Land use	LU_PCNFO	Percent cover of native forests	93.1
Land use	LU_PCWET	Percent cover of wetlands	84.8
Land use	LU_PCAFM	Percent cover of complex agroforestry mosaics	73.5
Land use	LU_PCPCO	Percent cover of permanent crops	39.7
Land use	LU_PCWTS	Percent cover of water surfaces	35.5
Land use	LU_PCPAC	Percent cover of permanent and annual crops	22.0
Land use	LU_PCBSD	Percent cover of beaches and sand dunes	13.7
Land use	LU_PCSPV	Percent cover of sparsely vegetated areas	9.9
Land use	LU_PCPAS	Percent cover of pasturelands	6.6
Land use	LU_PCBRS	Percent cover of bare rock surfaces	0.8

Table S4 – Driver importance ranking for the 20-best selected variables for the final random forest model (ordered in descendent fashion).

Variable type	Variable acronym	Description	Average Importance	Std-deviation
Climate	CL_BIO06	BIO6 - Min Temperature of Coldest Month	1243.9	49.2
Land use	LU_PCEFO	Percent cover of eucalyptus (production) forest	1133.7	67.8
Climate	CL_BIO04	BIO4 - Temperature Seasonality (standard deviation $\times 100$)	1072.3	46.0
Land use	LU_PCSHL	Percent cover of shrublands	816.8	46.4
Climate	CL_BIO15	BIO15 - Precipitation Seasonality (Coefficient of Variation)	805.7	42.3
Land use	LU_PCOPF	Percent cover of other production forests	637.0	44.8
Landscape pattern / heterogeneity	LP_MNPAR	Landscape Mean Patch Area	609.9	41.9
Landscape pattern / heterogeneity	LP_SPDVI	Landscape Simpson Diversity	583.4	42.5
Land use	LU_PCPFO	Percent cover of maritime-pine (production) forest	505.5	27.2
Climate	CL_BIO18	BIO18 - Precipitation of Warmest Quarter	435.7	25.2
Land use	LU_PCACO	Percent cover of annual crops	407.3	29.7
Soil properties	SO_PCLAY	Percent of clay in soils	400.5	30.6
Land use	LU_PCART	Percent cover of artificial/urban areas	311.9	19.5
Topography / Geomorphology	TG_RADAV	Average Solar Radiation	307.6	28.2
Disturbance	DT_BA5YR	Total Burnt Area (last 5 years)	296.3	26.1
Soil properties	SO_AVWTC	Available water content	240.3	18.2
Landscape pattern / heterogeneity	LP_PACOV	Landscape Patch Area Coefficient of variation	236.9	19.2
Soil properties	SO_PCOAR	Percent of coarse elements in soils	215.3	17.0
Linear elements	LE_TLMTW	Total length of motorways	214.3	19.0
Linear elements	LE_TLRIV	Total length of rivers	213.7	15.1







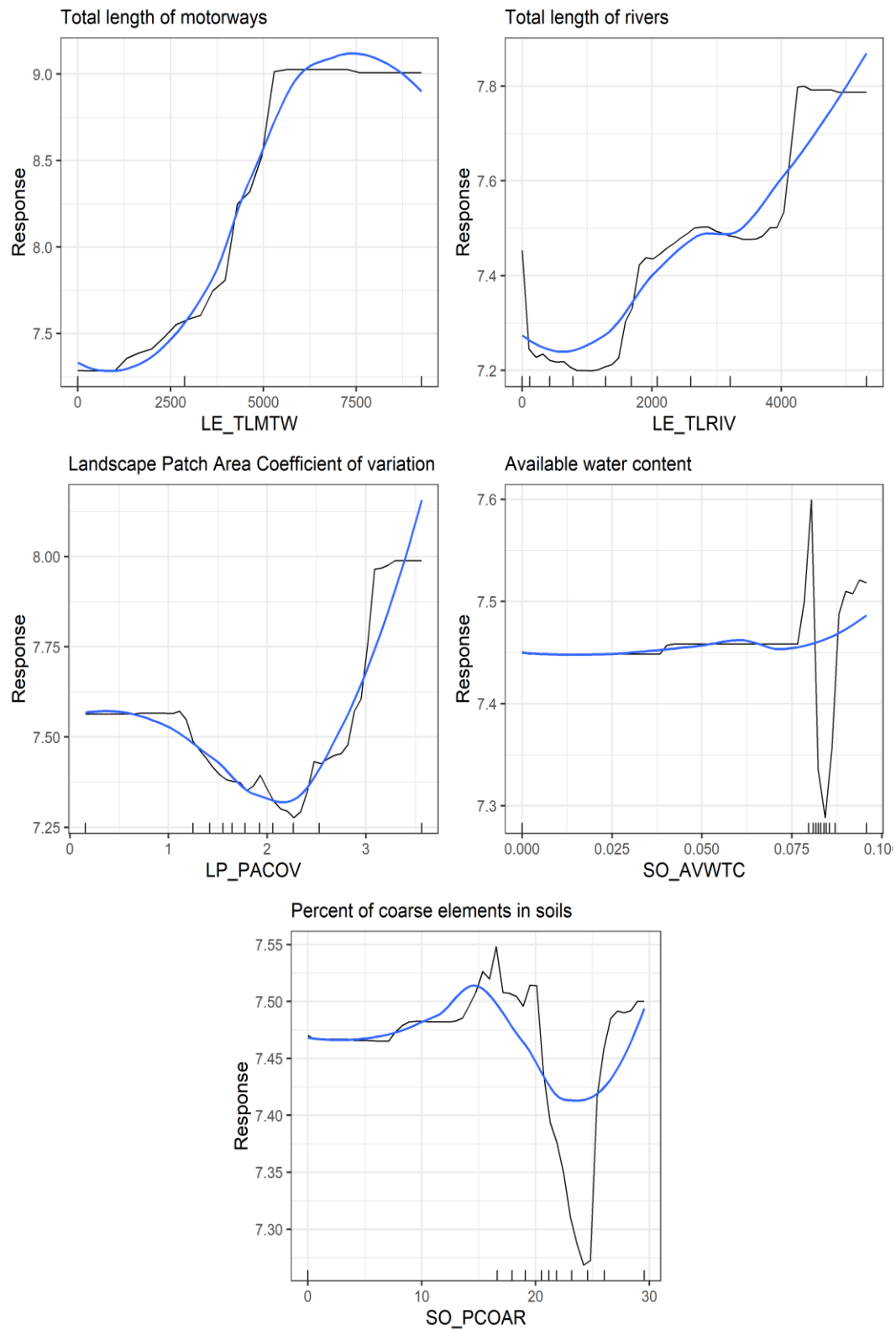


Figure S1 – Partial dependence plots for all variables used in RF models, showing the relation between the response variable (abundance given by the percentage of invaded area, in the y-axis) and the selected predictive variables of different environmental factors (x-axis). The black line indicates the “raw” response from the RF model, while the blue line applies a moving average smooth.