

**Supporting Information to the paper**

'Remote sensing of beta diversity: evidence from plant communities in a semi-natural system'

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## Appendix 1. Supporting Tables and Figures

Table S1: Selected time series of Sentinel-2A images.

Date	# plots covered by cloud mask	Image Granule ID
3 February 2017	0	T28RBS_A008457_20170203T120317
14 January 2017	0	T28RBS_A008171_20170114T120212
5 November 2016	2	20161105T171456_A007170_T28RBS
26 September 2016	2	20160926T185349_A006598_T27RYM
6 September 2016	0	20160906T185710_A006312_T27RYM
17 August 2016	0	20160817T185425_A006026_T27RYM
28 July 2016	2	20160728T185358_A005740_T27RYM
8 June 2016	1	20160608T185127_A005025_T27RYM
29 May 2016	1	20160529T184805_A004882_T27RYM
19 May 2016	1	20160519T185155_A004739_T27RYM
9 April 2016	0	20160409T185621_A004167_T27RYM
10 March 2016	2	20160310T202218_A003738_T27RYM
9 February 2016	1	20160209T202004_A003309_T27RYM

Table S2: R-functions and packages used for the statistical analyses.

Statistical Analysis	R-function	R-package	Settings different from default
Generalized Additive Models	gam()	mgvc	
Non-parametric Kruskal-Wallis Analysis of Variance ANOVA	kruskalmc()	stats	
Linear Regression	lm()	stats	
Non-metric Multidimensional Scaling	metaMDS() ordisurf() envfit()	vegan	
Mantel test	mantel()	stats	Pearson's correlation coefficient, 1000 permutations
Variation Partitioning	varpart()	vegan	
K-means Unsupervised Classification	kmeans()	stats	1000 iterations of random starting configurations
Multivariate Analysis of Variance	adonis()	vegan	
Principal Component Analysis	prcomp()	stats	

Table S3: Results of post-hoc correlation of explanatory variables to the NMDS and PCA via vector fitting. For further information see main text.

	NMDS		PCA	
	R <sup>2</sup>	p	R <sup>2</sup>	p
<b>Band 2</b>	0.05	0.19	0.83	0.001
<b>Band 3</b>	0.14	0.009	0.88	0.001
<b>Band 4</b>	0.03	0.434	0.88	0.001
<b>Band 5</b>	0.24	0.001	0.84	0.001
<b>Band 6</b>	0.52	0.001	0.85	0.001
<b>Band 7</b>	0.49	0.001	0.85	0.001
<b>Band 8</b>	0.44	0.001	0.86	0.001
<b>Band 8a</b>	0.47	0.001	0.83	0.001
<b>Band 11</b>	0.08	0.059	0.70	0.001
<b>Band 12</b>	0.04	0.258	0.75	0.001
<b>NDVI</b>	0.10	0.031	0.88	0.001
<b>PRI</b>	0.05	0.204	0.45	0.001
<b>ACR1</b>	0.01	0.826	0.28	0.001
<b>CRI1</b>	0.04	0.277	0.43	0.001
<b>PSRI</b>	0.14	0.01	0.64	0.001
<b>MSI</b>	0.21	0.001	0.71	0.001
<b>LAI</b>	0.16	0.004	0.70	0.001
<b>RP0.5m</b>	0.21	0.001	0.66	0.001
<b>RP2m</b>	0.12	0.006	0.25	0.001
<b>RP5m</b>	0.43	0.001	0.21	0.002
<b>RP10m</b>	0.11	0.023	0.16	0.005
<b>RP15m</b>	0.02	0.532	0.45	0.001
<b>RP20m</b>	0.03	0.365	0.37	0.001
<b>RP25m</b>	0.01	0.795	0.31	0.001
<b>RP&gt;25m</b>	0.00	0.997	0.16	0.005
<b>CHM</b>	0.00	0.873	0.59	0.001
<b>TFC</b>	0.07	0.088	0.71	0.001
<b>VF</b>	0.21	0.001	0.66	0.001
<b>Adenocarpus.viscosus</b>	-	-	0.29	0.001
<b>Arrhenatherum.calderae</b>	-	-	0.18	0.003

<b>Cistus.monspeliensis</b>	-	-	0.03	0.353
<b>Cistus.symphytifolius</b>	-	-	0.01	0.795
<b>Erica.arborea</b>	-	-	0.05	0.185
<b>Euphorbia.balsamifera</b>	-	-	0.39	0.001
<b>Pinus.canariensis</b>	-	-	0.43	0.001
<b>Retama.rhodorrhizoides</b>	-	-	0.40	0.001
<b>Rubia.fruticosa</b>	-	-	0.16	0.004
<b>Schizogyne.sericea</b>	-	-	0.09	0.043
<b>Soil</b>	-	-	0.14	0.008
<b>Rock</b>	-	-	0.36	0.001
<b>Pine.needle</b>	-	-	0.22	0.001
<b>Deadwood</b>	-	-	0.28	0.001

Table S4: The PCA loadings of the RS variables, the axes' standard deviations and (cumulative) variances explained. For further information see main text.

	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10	PC11	PC12
<b>Band 2</b>	-0.24	0.19	-0.03	0.16	-0.07	0.21	-0.07	0.18	-0.06	0.07	-0.08	0.04
<b>Band 3</b>	-0.19	0.28	-0.08	0.08	-0.09	0.11	-0.16	0.15	-0.07	0.07	-0.11	0.07
<b>Band 4</b>	-0.25	0.17	-0.06	0.15	-0.07	0.00	-0.12	0.11	-0.10	-0.02	-0.06	0.17
<b>Band 5</b>	-0.16	0.31	-0.05	0.16	0.13	-0.06	0.00	0.06	0.01	0.11	-0.38	0.12
<b>Band 6</b>	0.09	0.36	-0.07	-0.04	0.24	0.06	0.02	-0.08	-0.03	0.07	-0.06	0.03
<b>Band 7</b>	0.11	0.35	-0.07	-0.04	0.25	0.02	0.03	-0.05	0.00	-0.01	0.02	0.01
<b>Band 8</b>	0.11	0.35	-0.10	-0.03	0.10	0.15	-0.05	0.06	-0.02	-0.22	0.21	-0.06
<b>Band 8a</b>	0.13	0.33	-0.04	-0.05	0.26	0.04	0.07	-0.16	0.01	-0.01	-0.01	0.05
<b>Band 11</b>	-0.20	0.20	-0.01	0.21	0.12	-0.27	0.14	-0.16	0.08	-0.08	0.33	-0.24
<b>Band 12</b>	-0.24	0.13	0.00	0.24	0.01	-0.22	0.05	-0.11	0.10	-0.02	0.28	-0.29
<b>NDVI</b>	0.28	0.05	0.05	-0.14	0.10	0.09	0.04	-0.04	0.09	-0.05	0.21	-0.16
<b>PRI</b>	-0.17	-0.15	0.16	0.29	0.16	0.37	0.27	0.15	-0.05	-0.05	0.06	-0.04
<b>ACR1</b>	0.13	-0.13	0.20	0.15	0.44	-0.20	0.30	-0.17	0.18	0.19	-0.33	0.30
<b>CRI1</b>	0.17	0.14	-0.15	-0.30	-0.16	-0.39	-0.25	-0.17	0.09	0.07	-0.08	0.05
<b>PSRI</b>	-0.24	-0.03	-0.11	0.09	-0.11	-0.38	-0.14	-0.04	-0.15	-0.18	0.01	0.38
<b>MSI</b>	-0.24	-0.10	0.01	0.18	0.03	-0.31	0.15	-0.17	0.09	0.10	0.04	-0.12
<b>LAI</b>	0.25	0.08	0.12	0.23	-0.11	-0.01	0.01	-0.02	0.05	0.01	0.49	0.48
<b>RP0.5m</b>	-0.22	-0.15	-0.21	-0.13	0.22	0.17	-0.19	-0.17	0.14	0.03	0.10	0.08
<b>RP2m</b>	-0.05	0.19	0.29	-0.29	-0.17	-0.18	0.44	0.17	-0.28	-0.11	-0.05	-0.01
<b>RP5m</b>	0.06	0.17	0.40	0.14	-0.28	0.07	-0.21	0.02	0.44	0.45	0.03	-0.01
<b>RP10m</b>	0.12	-0.01	0.37	0.27	0.07	0.00	-0.39	-0.25	-0.07	-0.56	-0.27	-0.20
<b>RP15m</b>	0.18	-0.13	0.07	0.17	0.31	-0.14	-0.25	0.19	-0.50	0.17	0.25	0.17
<b>RP20m</b>	0.17	-0.08	-0.30	0.12	0.16	-0.25	-0.06	0.46	0.03	0.19	-0.07	-0.37
<b>RP25m</b>	0.17	-0.02	-0.36	0.19	-0.15	0.01	0.25	0.18	0.40	-0.42	-0.05	0.24
<b>RP&gt;25m</b>	0.12	0.02	-0.26	0.21	-0.30	0.20	0.20	-0.54	-0.36	0.25	-0.06	-0.06
<b>CHM</b>	0.23	-0.03	-0.30	0.26	-0.12	0.00	0.07	-0.06	-0.11	0.02	-0.11	-0.09
<b>TFC</b>	0.25	0.00	-0.03	0.33	-0.09	-0.03	-0.15	0.05	0.03	0.04	-0.08	-0.08
<b>VF</b>	0.22	0.15	0.21	0.13	-0.22	-0.17	0.19	0.17	-0.14	-0.03	-0.10	-0.08
<b>Standard deviation</b>	3.31	2.44	1.55	1.48	1.28	1.10	1.01	0.93	0.76	0.58	0.49	0.44
<b>Proportion of Variance</b>	0.39	0.21	0.09	0.08	0.06	0.04	0.04	0.03	0.02	0.01	0.01	0.01
<b>Cumulative Proportion</b>	0.39	0.60	0.69	0.77	0.83	0.87	0.90	0.94	0.96	0.97	0.98	0.98





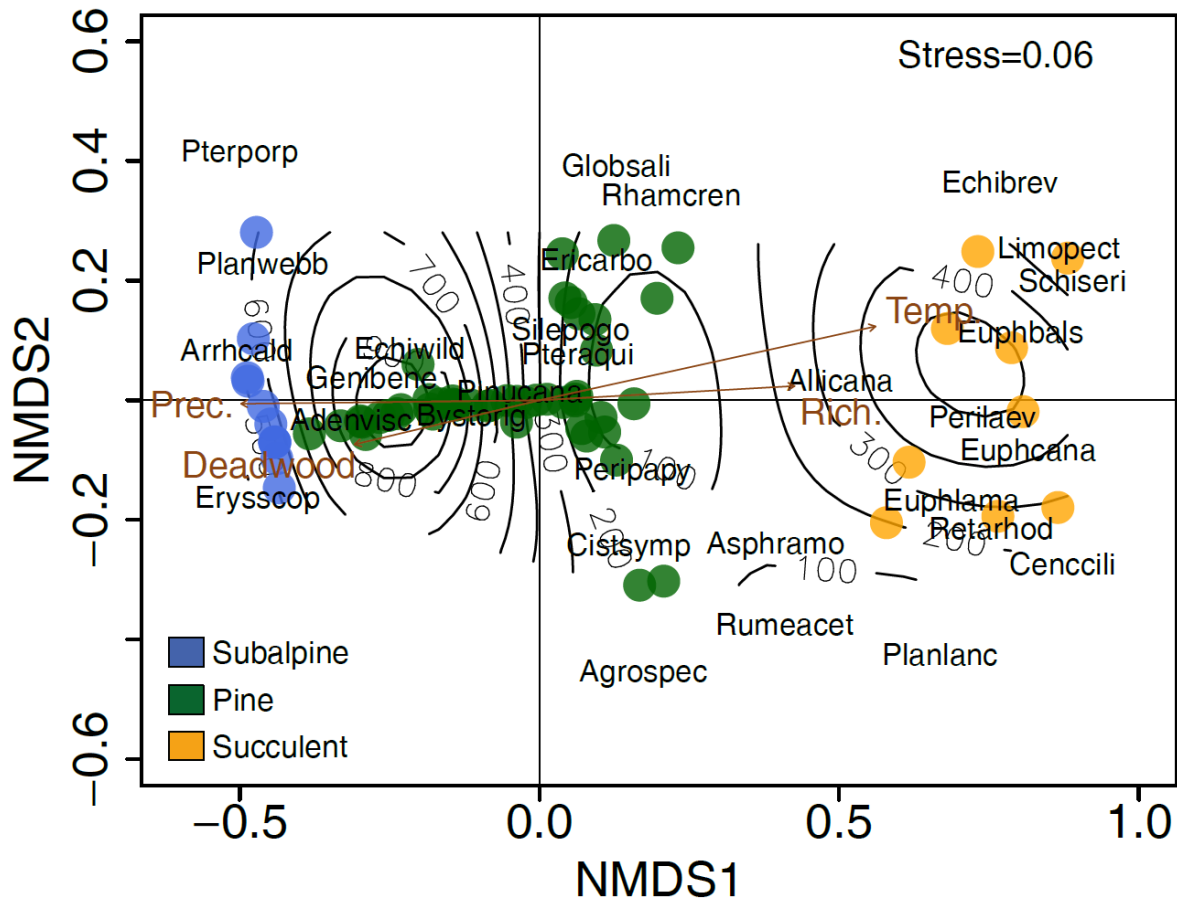


Figure S1: The location of sampling plots in the two-dimensional ordination space calculated via Non-metric Multidimensional Scaling (NMDS). The NMDS space is representing beta diversity or compositional dissimilarity calculated by Hellinger distance between sampling units considering abundances of perennial plant species. The stress value 0.06 depicts a good fit. The position of species and environmental vectors was calculated by post-hoc vector fitting. The following explanatory variables were significantly ( $p < 0.05$ ) related to NMDS axes. Temp.=Mean annual temperature, Prec.=Annual precipitation, Rich.=Perennial species richness, and Deadwood. Black contour lines depict the distance in meter to the nearest human infrastructure, i.e. roads and buildings of any kind. For further information see main text.



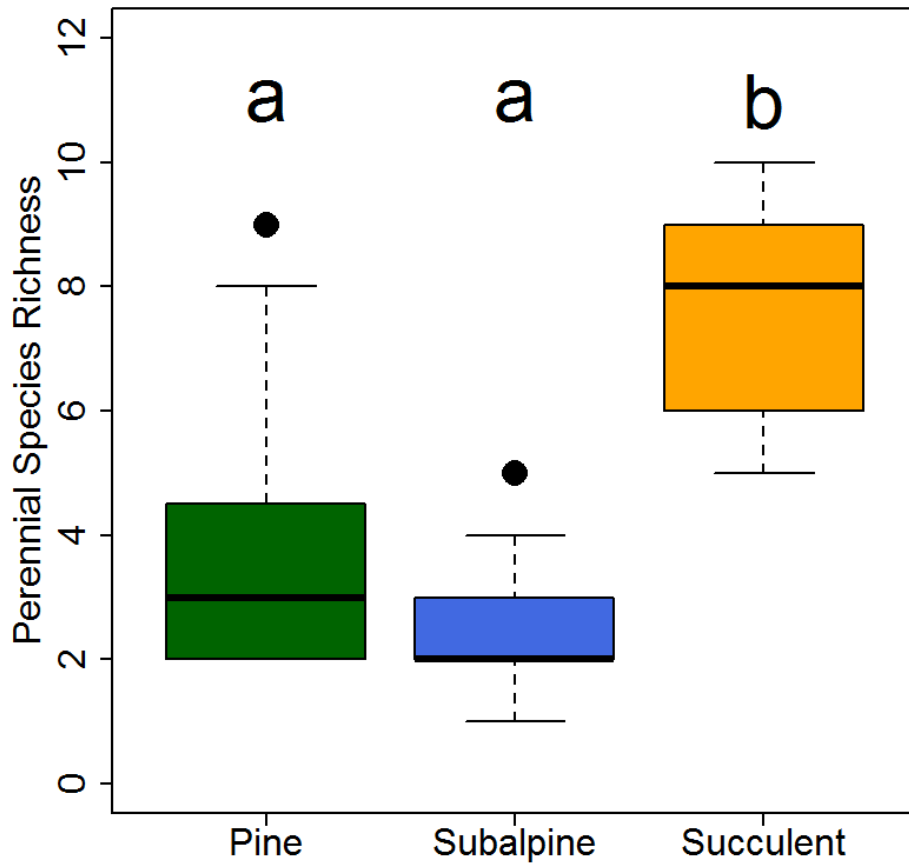


Figure S2: Species richness in three community types as defined by the occurrence of *Pinus canariensis*. Different lower cases indicate significant differences of species richness between classes as calculated by the non-parametric Kruskal-Wallis Analysis of Variance (ANOVA) test.