

*Journal of Biogeography*  
**SUPPORTING INFORMATION**

**The rich sides of mountain summits - a pan-European view on aspect preferences of alpine plants**

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**Appendix S1:** Characteristics of summits in 32 mountain regions used to test for the effect of cardinal directions of slopes (E=east, S=south, W=west, N=north) on vascular plant species diversity. Soil temperature and species data for two surveys in 2001 and 2008 (necessary to calculate colonization and disappearance) are only available for regions given with bold and underlined numbers. Temperature sums represent values of hourly measurements of soil temperatures above a threshold of 3 °C summed up during the growing season (May-September) and averaged for the years 2002 to 2007. Gaps in temperature measurement series were filled through imputation. This process was repeated 30 times, and mean temperature sum values were calculated.

Biome	Region ID	Region (Country)	Latitude/ Longitude	Altitude	Year 1/ Year 2	Species number year 1/year 2				Colonizations/Disappearances				Species number summit	Shannon index				Temperature sums			
						E	S	W	N	E	S	W	N		E	S	W	N	E	S	W	N
<b>Polar</b>	<b>1</b>	Zackenber (Greenland)	74.50/-20.48	90	2008	6	10	16	6					22	1.68	1.82	1.84	1.70				
				470	2008	21	4	2	7					21	2.61	0.18	0.69	1.48				
				605	2008	6	5	3	7					10	1.68	1.15	0.87	1.56				
	<b>2</b>	Stremoy (Faroe Islands)	62.13/-6.94	372	2009	19	18	18	21					29	2.29	2.34	2.23	2.42				
				540	2009	9	11	9	15					19	1.71	2.13	0.98	2.23				
				621	2009	18	16	13	14					23	2.04	2.40	1.75	2.10				
				752	2010	27	25	23	28					41	2.69	2.62	2.91	2.63				
	<b>3</b>	Cairngorms (Scotland, UK)	57.09/-3.84	742	2001/2008	3/4	3/4	4/5	4/5	1/0	1/0	1/0	1/0	5	0.34	0.39	0.48	0.48	24111	21842	22004	22956
				904	2001/2008	1/3	4/6	6/8	5/5	2/0	2/0	2/0	0/0	7	0.00	1.14	1.28	1.11	19393		21793	18043
				978	2001/2008	4/5	4/6	5/5	4/5	1/0	2/0	1/1	1/0	5	1.29	1.20	1.42	1.15		17992	18841	20878
1111				2001/2008	4/5	4/4	4/5	3/3	1/0	0/0	1/0	0/0	4	1.19	0.93	1.20	1.07	17661	13017	19779	17166	
<b>4</b>	S-Scandes / Dovrefjell (Norway)	62.30/9.51	1161	2001/2008	14/15	13/17	14/18	8/11	2/1	4/0	5/1	3/0	21	1.56	0.70	1.22	0.76	11694	16128	17404	18259	
			1418	2001/2008	6/7	6/6	6/6	7/7	1/0	0/0	0/0	0/0	9	0.59	1.23	0.98	1.24	19008	13990	19054	18609	
			1651	2001/2008	4/3	2/2	2/1	0/0	0/1	0/0	0/1	0/0	5	0.98	0.13	0.08		10842	8534	13610	10382	
			1845	2001/2008	0/0	2/2	0/0	0/0	0/0	0/0	0/0	0/0	2		0.13			7230	5015	9065	8593	
<b>Boreal</b>	<b>5</b>	S-Scandes / Sylarna, Jämtland (Sweden)	63.09/12.54	848	2010	15	10	13	10					24	1.22	1.23	1.18	1.13				
				1233	2010	14	12	13	14					19	1.68	1.22	1.13	1.53				
				1426	2010	5	6	4	5					7	1.08	1.38	1.15	0.62				
				1626	2010	1	2	1	3					3	0.00	0.64	0.00	0.74				
<b>6</b>	N-Scandes / Latnjajaure	68.37/18.49	492	2001/2008	27/27	32/24	25/26	20/24	2/2	2/10	3/2	5/1	52	2.09	2.68	2.02	1.71	18592	18135	26822	13838	
			1000	2001/2008	9/11	20/21	11/11	11/12	3/1	2/1	0/0	1/0	26	1.04	1.64	1.54	1.58	18409	14729	15413	11314	

Biome	Region ID	Region (Country)	Latitude/ Longitude	Altitude	Year 1/ Year 2	Species number year 1/year 2				Colonizations/Disappearances				Species number summit	Shannon index				Temperature sums			
						E	S	W	N	E	S	W	N		E	S	W	N	E	S	W	N
		(Sweden)		1300	2001/2008	9/11	15/15	6/7	5/3	2/0	1/1	1/0	0/2	21	1.48	1.37	0.35	0.33	10993	12750	13183	13314
	7	North Urals (Russia)	59.62/59.13	1560	2001/2008	2/2	0/0	3/3	0/0	0/0	0/0	0/0	0/0	3	0.64	0.08			7463	7214	3789	8278
				1077	2003	29	38	38	22					64	2.30	2.95	2.48	2.17				
				1239	2003	26	21	20	25					38	2.36	2.00	2.03	2.13				
				1350	2003	0	5	1	15					16		1.47	0.00	1.97				
				1459	2003	17	16	11	10					22	2.29	2.02	1.48	1.86				
	8	South Urals (Russia)	54.82/59.20	1109	2001/2008	13/13	8/11	9/13	11/15	2/2	4/1	5/1	5/1	18	1.61	1.32	1.35	1.62	15993		19698	
				1413	2001/2008	18/19	15/15	15/16	11/11	2/1	2/2	2/1	0/0	22	2.03	1.24	1.76	1.80	20010	13667	11125	12068
				1437	2001/2008	20/22	19/20	13/15	17/19	2/0	2/1	2/0	2/0	29	1.64	1.55	1.90	1.69	17350	16320	16734	16228
				1565	2001/2008	16/17	12/11	13/13	11/12	2/1	0/1	1/1	1/0	16	1.88	1.86	1.48	1.49	18392	17439		11674
	9	Polar Urals (Russia)	66.96/65.66	300	2001/2008	9/12	6/7	6/6	4/5	4/1	1/0	1/1	1/0	13	1.20	1.20	1.09	0.99	19394	15779	18810	16207
				417	2001/2008	11/12	7/8	14/16	4/6	1/0	2/1	2/0	3/1	20	1.59	1.17	1.53	1.08	17241	13964	19101	18235
				641	2001/2008	6/5	4/5	13/12	14/24	0/1	1/0	2/3	12/2	19	1.55	0.55	1.71	1.90	13937	6027	9199	9578
				839	2001/2008	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0					12261	11997		14256
	10	Siliceous Central Pyrenees, Valles Tena y	42.74/-0.23	2302	2011	22	16	22	19					40	2.47	1.66	1.80	2.48				
				2555	2011	13	13	29	15					41	1.87	1.66	2.57	1.45				
				2731	2011	19	19	0	9					29	2.01	2.32		1.70				
				2827	2011	9	23	14	5					31	1.46	2.41	1.99	1.54				
	11	Central Pyrenees / Ordesa (Spain)	42.65/0.00	2242	2001/2008	35/43	15/25	17/19	29/33	14/6	12/2	3/1	7/3	55	2.62	1.54	1.57	2.02	36756	30978	31111	29340
				2519	2001/2008	14/11	32/28	21/23	17/11	1/4	4/8	4/2	1/7	38	2.09	2.56	2.38	2.14	29864	26049	26773	
				2779	2001/2008	14/11	5/4	3/4	1/1	4/7	0/1	1/0	0/0	15	1.86	1.45	0.82	0.00	18128	15448		18016
				3022	2001/2008	3/2	1/2	0/0	1/1	1/2	2/1	0/0	0/0	5	0.56	0.00		0.00	13118	12591		11672
	12	SW-Alps / Mercantour (France)	44.31/6.94	2508	2001	21	23	31	21					41	2.10	2.43	2.32	2.00				
				2700	2001	20	14	29	20					36	1.94	1.77	2.22	2.04				
				2792	2001	10	12	25	11					36	1.36	2.01	2.19	1.14				
				3031	2001	15	14	5	15					23	2.09	1.94	1.23	1.88				
	13	W-Alps / Alps of Valais-Entremont (Switzerland)	46.01/7.23	2360	2001/2008	21/21	23/25	20/21	26/23	1/1	3/1	2/1	0/3	42	1.93	1.76	1.65	2.15	20865	18767	30201	20667
				2550	2001/2008	24/28	29/29	25/23	24/25	5/1	3/3	1/3	3/2	43	1.25	1.98	1.86	2.33	27297	12530	23493	18764
				2989	2001/2008	20/25			2/2	7/2			0/0	21	2.10			0.19	14797	4375	17204	14281
				3212	2001/2008	0/0	0/0		2/2	0/0	0/0		0/0	2				0.50	10206	5734	9994	7367
	14	W-Alps / Mont Avic (Italy)	45.69/7.49	2340	2002	31	8	18	24					41	2.21	1.30	1.94	2.15				
				2584	2002	31	21	18	25					47	2.24	2.45	2.41	2.53				
				2790	2002	15	0	15	4					21	2.23		2.34	0.62				
				3014	2002	17	8	7	5					18	2.23	1.73	1.50	1.53				
	15	Central Alps / Swiss NP - carbonatic (Switzerland)	46.65/10.22	2438	2003	36	16	10	12					39	2.43	0.58	0.96	0.98				
				2542	2002	18	16	8	8					21	2.03	1.64	1.43	1.04				
				2836	2002	3	14	3	4					17	0.71	2.03	0.50	1.16				
				3092	2002	0	5	1	1					5		1.16	0.00	0.00				
	16	Central Alps /	46.69/10.37	2424	2003	53	44	29	36					77	3.03	3.08	1.65	2.26				

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						E	S	W	N	E	S	W	N		E	S	W	N	E	S	W	N
Temperate	17	Swiss NP - siliceous (Switzerland)	44.23/10.44	2519	2002	42	38	31	29					74	2.31	2.16	2.43	2.53				
				2797	2003	27	22	9	8					37	1.96	1.63	1.83	1.65				
				3104	2002	3	1	4	2					7	0.46	0.00	1.16	0.56				
				1722	2001/2008	29/29	33/32	30/27	20/18	5/5	1/2	4/7	2/4	49	1.81	2.35	1.67	1.44	39087	20652	28200	25837
	18	Apennines (Italy)	46.74/11.03	1815	2001/2008	26/29	39/44	26/27	35/34	4/1	9/4	4/3	5/6	64	1.97	1.80	1.16	1.76	42004	19542	35109	32975
				1855	2001/2008	28/31	22/22	34/35	21/22	7/4	2/2	5/4	4/3	47	2.12	1.75	2.98	2.32	34748	17222	29050	29671
				1978	2001/2008	47/52	25/27	33/39	42/40	9/4	3/1	6/0	3/5	67	3.00	1.78	2.54	2.56	25154	29439	27191	22825
				2180	2003	39	35	31	27					54	2.76	1.78	2.49	2.53				
	19	Central Alps / Texelgruppe (Italy)	46.41/11.64	2619	2003	17	22	21	16					32	1.81	2.17	1.98	1.93				
				3074	2001	16	20	19	12					24	2.08	2.21	1.55	1.57				
				3287	2003	5	3	3	1					6	0.87	0.95	1.00	0.00				
				2199	2001/2008	39/38	46/47	54/51	37/44	5/6	8/7	3/6	9/2	102	2.09	2.69	3.23	2.23	17769	19189	23183	18936
	20	S-Alps / Dolomites (Italy)	47.51/13.00	2463	2001/2008	27/25	24/22	23/23	26/23	4/6	3/5	5/5	4/7	38	2.27	1.65	2.03	1.45	21646	19023	22949	20410
				2757	2001/2008	24/24	34/40	14/16	14/15	7/7	8/2	6/4	3/2	43	1.33	2.32	1.78	1.26	12237	11898	18332	8216
				2893	2001/2008	12/15	11/14	9/8	7/11	5/2	4/1	4/5	6/2	16	1.33	1.53	1.69	1.05	10377	7010	10072	6704
				2203	2004	58	46	16	37					79	3.11	2.63	1.12	2.72				
	21	N-Alps / NP Berchtesgaden (Germany)	47.56/14.68	2462	2005	18	16	24	13					32	1.13	1.82	1.81	1.23				
				2517	2006	16	21	10	24					38	2.03	1.59	1.25	2.21				
				1856	2009	31	32	45	53					79	2.47	2.46	2.13	2.59				
				2046	2009	33	39	43	31					58	2.06	2.62	2.37	1.61				
	22	Gesäuse (Austria)	47.61/15.13	2116	2009	55	56	30	49					95	2.95	3.07	1.30	2.02				
				1910	2001/2008	44/39	71/71	48/52	54/55	3/8	6/6	8/4	3/2	100	1.97	3.11	2.48	2.59	13282	15779	20746	21717
				2065	2001/2008	37/32	40/42	21/21	20/21	2/7	6/4	1/1	1/0	57	1.19	2.26	0.87	0.96	18519	12921	19239	14814
				2214	2001/2008	38/44	57/63	26/27	27/25	9/3	9/3	4/3	2/4	73	1.68	2.74	2.07	1.79	14318	14075	15340	13283
23	W-Carpathians / High Tatra (Slovakia)	49.17/19.99	2255	2001/2008	27/30	37/40	17/17	25/27	7/4	3/0	2/2	4/2	46	1.32	1.89	1.70	1.77	12145	12661	15914	14023	
			1919	2001/2008	21/19	22/23	13/15	12/15	0/2	1/0	2/0	3/0	29	2.51	2.48	1.67	1.62	18019	13481	20888	16001	
			2052	2001/2008	15/14	15/17	10/11	12/12	0/1	2/0	1/0	1/1	22	1.93	1.94	1.72	1.58	18175	13656	17484	14927	
			2061	2001/2008	12/12	13/15	7/8	16/15	1/1	2/0	1/0	0/1	23	1.54	1.73	1.53	1.51	21658	19021	19842	15395	
24	E-Carpathians / Rodnei Mts. (Romania)	47.59/24.63	2336	2001/2008	12/15	10/9	3/5	9/10	3/0	1/2	2/0	1/0	19	1.75	1.41	0.94	1.58	17059	10134	15430	7534	
			2063	2001/2008	15/15	7/7	7/9	11/12	0/0	0/0	2/0	1/0	21	1.42	0.61	1.33	1.32	16533	15899	19273	19276	
			2116	2001/2008	6/9	14/13	8/10	9/9	3/0	0/1	2/0	0/0	15	0.85	1.65	1.42	1.57	15222	15833	16730	15412	
			2221	2001/2008	9/14	5/7	4/6	6/8	6/1	2/0	2/0	2/0	11	0.85	0.75	0.87	1.16	16149	12257	15893	16735	
25	Central Caucasus / Kazbegi region (Georgia)	42.51/44.49	2268	2001/2008	8/7	7/9	3/4	13/16	1/2	2/0	1/0	4/1	15	1.43	1.15	0.83	1.77	16488	10157	17748	15773	
			2240	2001/2008	22/36	30/33	30/33	34/36	15/1	4/1	4/1	2/0	61	2.78	3.02	2.85	3.10	32417	32539		38178	
			2477	2001/2008	36/40	30/37	39/44	30/33	6/2	7/0	5/0	3/0	70	2.89	2.58	3.12	2.92			28576	28448	
			2815	2001/2008	12/19	11/13	13/16	15/17	7/0	3/1	4/1	4/2	16	2.11	2.08	2.03	2.35	21885	22810	18467	24273	
26	Sistema Central (Spain)	40.79/-3.98	3024	2001/2008	19/24	14/17	5/12	10/13	5/0	3/0	7/0	3/0	26	2.45	2.32	1.47	2.05	23988	20680	18293	20387	
			2170	2006	7	6	6	8					10	1.26	0.43	0.77	0.87					
				2210	2006	21	14	16	16				27	1.98	1.01	1.45	1.87					

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						E	S	W	N	E	S	W	N		E	S	W	N	E	S	W	N	
Mediterranean	<u>27</u>	Sierra Nevada - West (Spain)	37.04/-3.37	2270	2006	15	18	12	12					22	1.79	1.43	1.44	1.24					
				2778	2001/2008	23/17	15/16	13/10	15/11	1/7	2/1	1/4	0/4	32	2.07	1.94	1.81	1.94	39345	41192	42002	39801	
				2968	2001/2008	20/19	21/22	17/18	18/11	2/3	3/2	1/0	0/7	31	2.52	2.59	2.12	2.01	39100	40439	43669	39479	
				3150	2001/2008	7/6	14/15	10/8	7/7	0/1	4/3	1/3	0/0	20	1.59	1.77	1.91	1.52	34848	33987	30628	32773	
	28	Sierra Nevada - Northeast (Spain)	37.12/-3.27	3327	2001/2008	2/2	2/2	2/2	4/5	0/0	0/0	1/1	1/0	5	0.13	0.20	0.54	1.09	21399	16784	26040	15450	
				2668	2004	19	12	17	19					28	1.13	1.41	1.82	2.51					
				2717	2006	10	19	14	10					31	1.56	1.67	0.99	0.69					
				2800	2004	10	15	15	22					32	1.60	1.89	1.55	1.85					
	29	Sistema Ibérico, Moncayo (Spain)	41.78/-1.84	3144	2004	5	2	7	10					15	0.33	0.19	0.83	1.50					
				2116	2012	7	11	16	0					18	1.05	1.49	1.92						
				2226	2012	1	0	14	16					21	0.00		1.72	1.18					
				2274	2012	0	11	16	0					17		0.70	1.41						
	<u>30</u>	Corsica / Monte Cinto (France)	42.42/8.93	2314	2012	16	18	8	12					24	1.89	1.64	1.09	1.30					
				2144	2001/2008	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0						32400			
				2305	2001/2008	1/3	6/8		5/0	2/0	2/0		0/5	10	0.00	1.28		0.83	31963		37860		
				2607	2001/2008	2/3	0/0	3/3	0/0	1/0	0/0	0/0	0/0	5	0.67		1.03			12563	27237	22809	
	<u>31</u>	Central Apennines / Majella (Italy)	42.07/14.10	2405	2001/2008	32/30	17/19	14/15	14/13	3/5	3/1	1/0	0/1	36	2.64	2.16	1.69	2.04	30139	18380	22992	20145	
				2511	2001	20	25	32	25					41	2.36	2.20	2.87	2.33			19048		
				2635	2001/2008	22/23	10/13	13/12	15/13	4/3	3/0	0/1	0/2	31	1.83	2.08	2.25	2.20	17472	13283	16442	13493	
				2737	2001/2008	7/6	11/10	10/8	7/7	2/3	0/1	0/2	1/1	13	1.53	2.01	2.06	1.75	13097	10416	8930	12081	
	<u>32</u>	Crete / Lefka Ori (Greece)	35.28/24.08	1664	2001/2008	25/22	29/29	21/23	23/27	1/4	4/4	3/1	5/1	46	2.14	1.62	1.96	2.21	58179	59518	62795	59074	
				1965	2001/2008	9/7	8/7	11/11	5/4	0/2	2/3	2/2	0/1	15	1.58	0.81	1.28	0.92	51273	42346	46595	43901	
				2160	2001/2008	3/3	6/5	3/3	2/2	0/0	0/1	0/0	0/0	8	0.75	1.60	1.01	0.61	40344	35859	46108	42410	
2339				2001/2008	0/0	2/5	3/3	5/5	0/0	3/0	0/0	0/0	6		0.56	0.91	1.24	41124	32697	41060	34870		