Ecography

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Sydenham, M. A. K., Moe, S. R., Totland, Ø. and Eldegard, K. 2014. Does multi-level environmental filtering determine the functional and phylogenetic composition of wild bee species assemblages? – Ecography doi: 10.1111/ecog.00938

Supplementary material

Supplementary material Appendix 1, Table A1 The life-history traits attributed to bee species sampled in power-line strips in southeast Norway. Traits were; body size (average intertegulae distance in millimeters, ITD) measured on the available nest founding females (Ind) at the Natural History Museum in Oslo, belowground nesters (End), aboveground nesters (Hyp), pollen specialists (Olig), pollen generalists (Poly), solitary (Soli), social (Soci), species emerging from march through April (Spri) and the duration the flight period lasts in months (Acti). For some species trait values were unattainable (n.a.). Only non-parasitic bees were included in the analysis throughout the paper. Traits were compiled following Westrich (1989). The nomenclature follows Michener (2007).

Species	ITD	Ind	End	Hyp	Olig	Poly	Soli	Soci	Spri	Acti
Andrena										
A. bicolor	2.1	10	X			X	X		X	5
A. carantonica	3.0	10	X			X	X		X	5
A. cineraria	2.9	10	X			X	X		X	2
A. clarkella	3.2	10	X		X		X		X	3
A. fucata	2.2	10	X			X	X		X	4
A. fulvida	2.3	4	X			X				2
A. fuscipes	2.2	10	X		X		X			3
A. haemorrhoa	2.6	10	X			X	X		X	4
A. helvola	2.4	10	X			X	X		X	4
A. lapponica	2.5	10	X		X		X		X	3
A. subopaca	1.4	10	X			X	X		X	6
A. wilkella	2.5	10	X		X		X			3
Anthidium										
A. punctatum	3.0	10		X		X	X			4
Bombus										
B. hortorum	6.0	10	X			X		X	X	7
B. hypnorum	5.7	2		X		X		X	X	6
B. jonellus	4.7	2		X		X		X	X	7
B. lucorum aggr	6.1	10	X			X		X	X	6
B. pascuorum	5.4	10	X			X		X	X	8
B. pratorum	5.2	10		X		X		X	X	7
B. ruderarius	n.a.	n.a.		X		X		X		5

B. soroeensis	n.a.	n.a.	X			X		X		5
B. sylvarum	5.4	2	X			X		X	X	7
Colletes										
C. daviesanus	2.6	10	X		X		X			4
C. succinctus	3.1	10	X		X		X			4
Halictus										
H. rubicundus	2.1	10	X			X		X	X	6
Hoplitis										
H. tuberculata	2.2	10		X		X	X			3
Hylaeus										
H. angustatus	0.9	5		X		X	X			5
H. annulatus	1.5	10		X		X	X			6
H. communis	1.4	10		X		X	X			5
H. confusus	1.5	10		X		X	X			5
H. hyalinatus	1.2	10		X		X	X			5
Lasioglossum										
L. albipes	1.5	10	X			X	n.a.	n.a.	X	7
L. calceatum	2.0	10	X			X		X	X	7
L. fratellum	1.5	10	X			X	n.a.	n.a.	X	6
L. leucopus	1.1	10	X			X	X		X	6
L. punctatissimum	1.3	10	X			X	n.a.	n.a.	X	7
L. rufitarse	1.4	10	X			X	X		X	6
Megachile										
M. nigriventris	4.3	3		X	X		X			2
M. versicolor	3.3	10		X		X	X			5

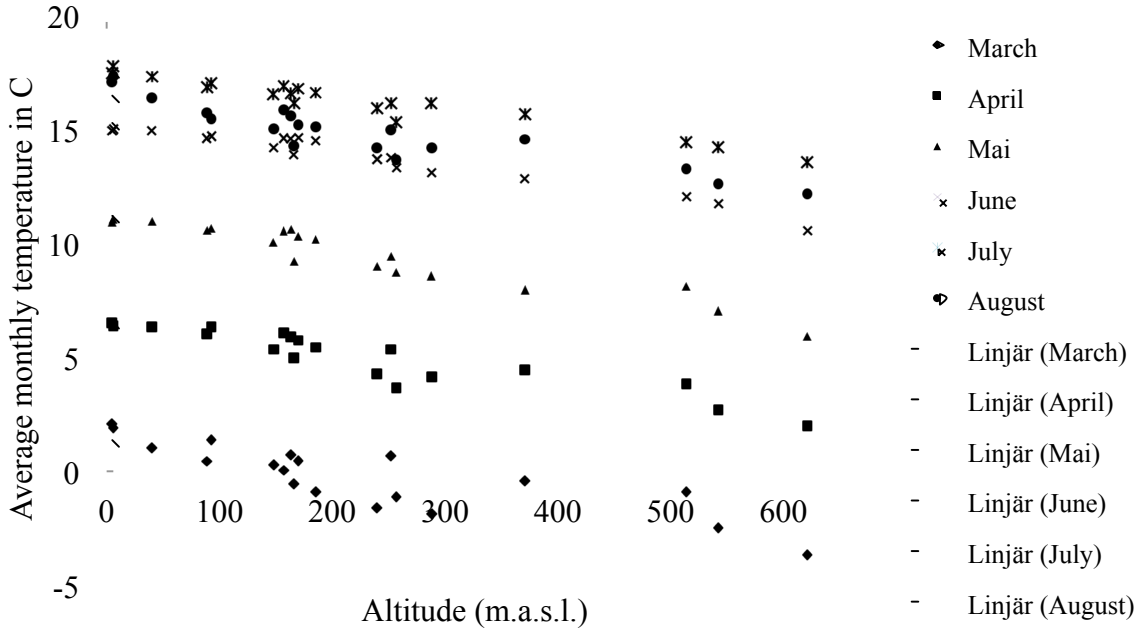
Osmia							
O. bicornis	3.1	10	X	X	X	X	5
O. caerulescens	2.5	8	X	X	X	X	5
O. nigriventris	3.3	8	X	X	X	X	3
O. parietina	2.1	9	X	X	X		3
O. uncinata	2.5	3	X	X	X		2

References

Michener, C. D. 2007. The bees of the world. — Johns Hopkins University Press.

Westrich, P. 1989. Die Wildbienen Baden-Württembergs. — E. Ulmer.

Supplementary material Appendix 2, Fig. A2.

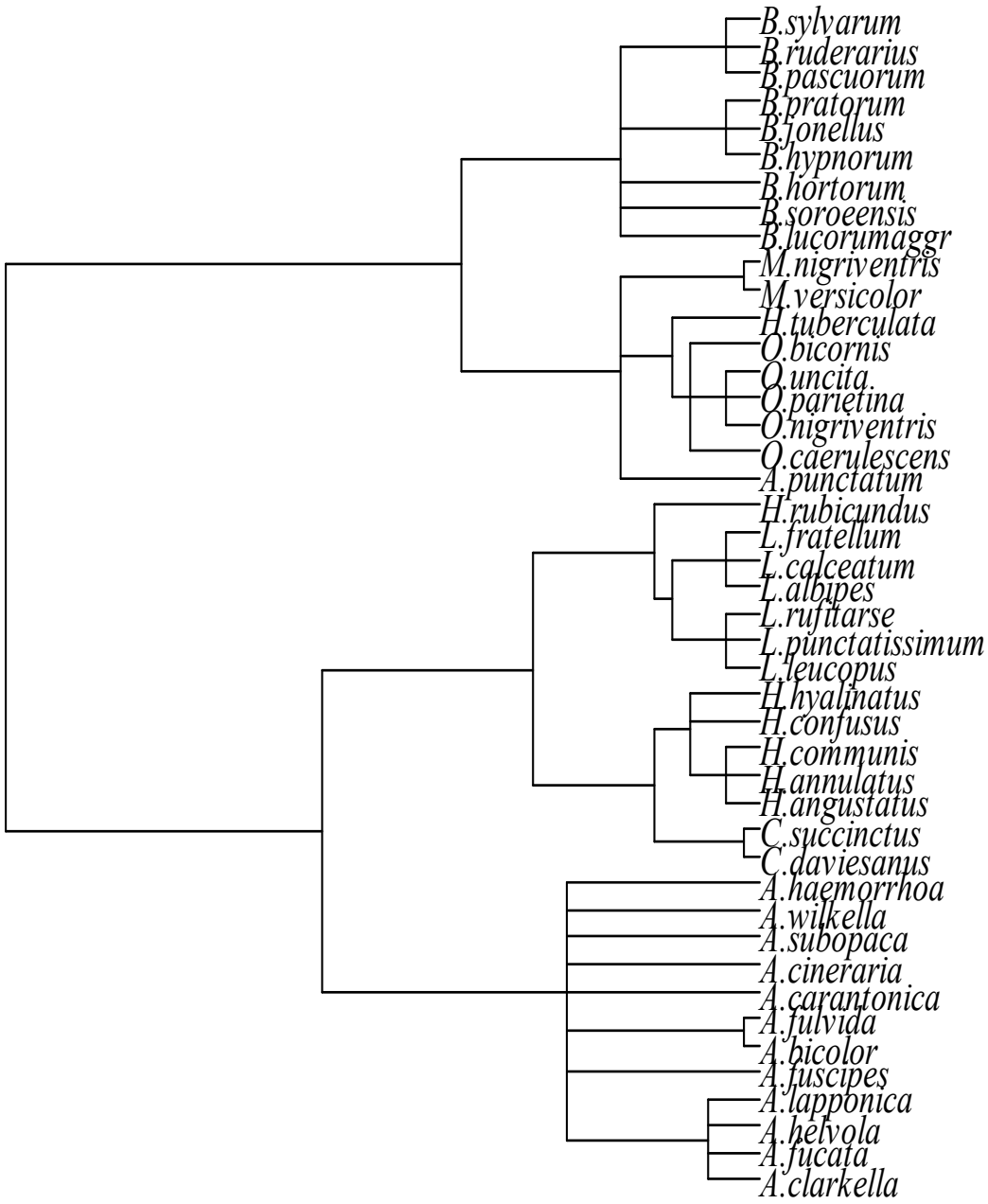


Supplementary material Appendix 2, Fig. A2 the linear relationship between altitude (m.a.s.l.) and the average temperature for March, April, Mai, June, July and August based on 20 meteorological climate stations within the study region. The temperature dropped by 0.69 C on average, as the altitude increased by 100 meters. Measurements at each altitudinal point were based on averages taken from the average monthly temperature during the time period 2003-2012. There were two climate stations situated at 240 m.a.s.l. providing the annual monthly average temperature at that altitude with two measurements. The included stations were, station number; 34130, 27500, 17150, 17850, 32060, 5590, 1130, 19710, 24890, 28380, 6020, 7010, 12680, 37230, 8140, 28800, 14600, 18950, 21680 and 61770.

References

The Norwegian meteorological institute: www.eklima.no.

Supplementary material Appendix 3, Fig. A3.



Supplementary material Appendix 3, Fig. A3 the hypothesized taxonomic relationship between the non-cleptoparasitic bees sampled in power-line strips in 2009 and 2010 in southeast Norway. The phylogeny was based on the taxonomy of Dansforth et al. (2006) and Michener (2007). The tree included: tongue length, family, sub family, tribe, genus, sub genus and species. The polytumous ultrametric tree was constructed using the r-package APE with the power-value set to 1 (Paradis et al. 2004)

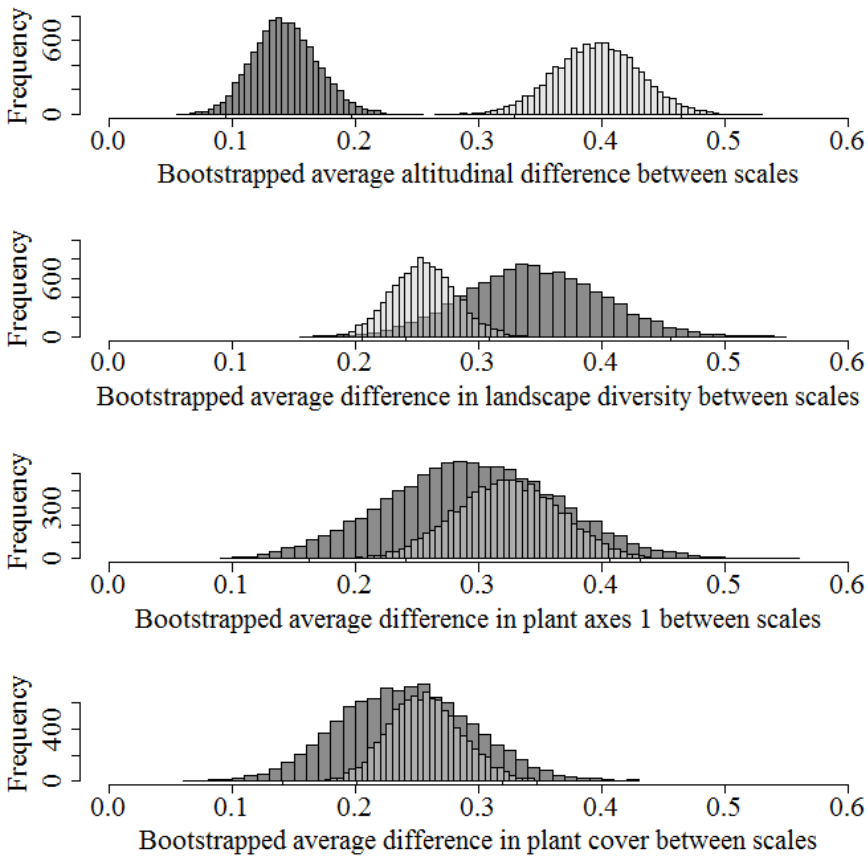
References

Danforth, B. N. et al. 2006. Analysis of family-level relationships in bees (Hymenoptera : Apiformes) using 28S and two previously unexplored nuclear genes: CAD and RNA polymerase II. — Mol Phylogenet Evol 39: 358-372.

Michener, C. D. 2007. The bees of the world. — Johns Hopkins University Press.

Paradis, E. et al. 2004. APE: Analyses of Phylogenetics and Evolution in R language. — Bioinformatics 20: 289-290.

Supplementary material Appendix 4, Fig. A4.



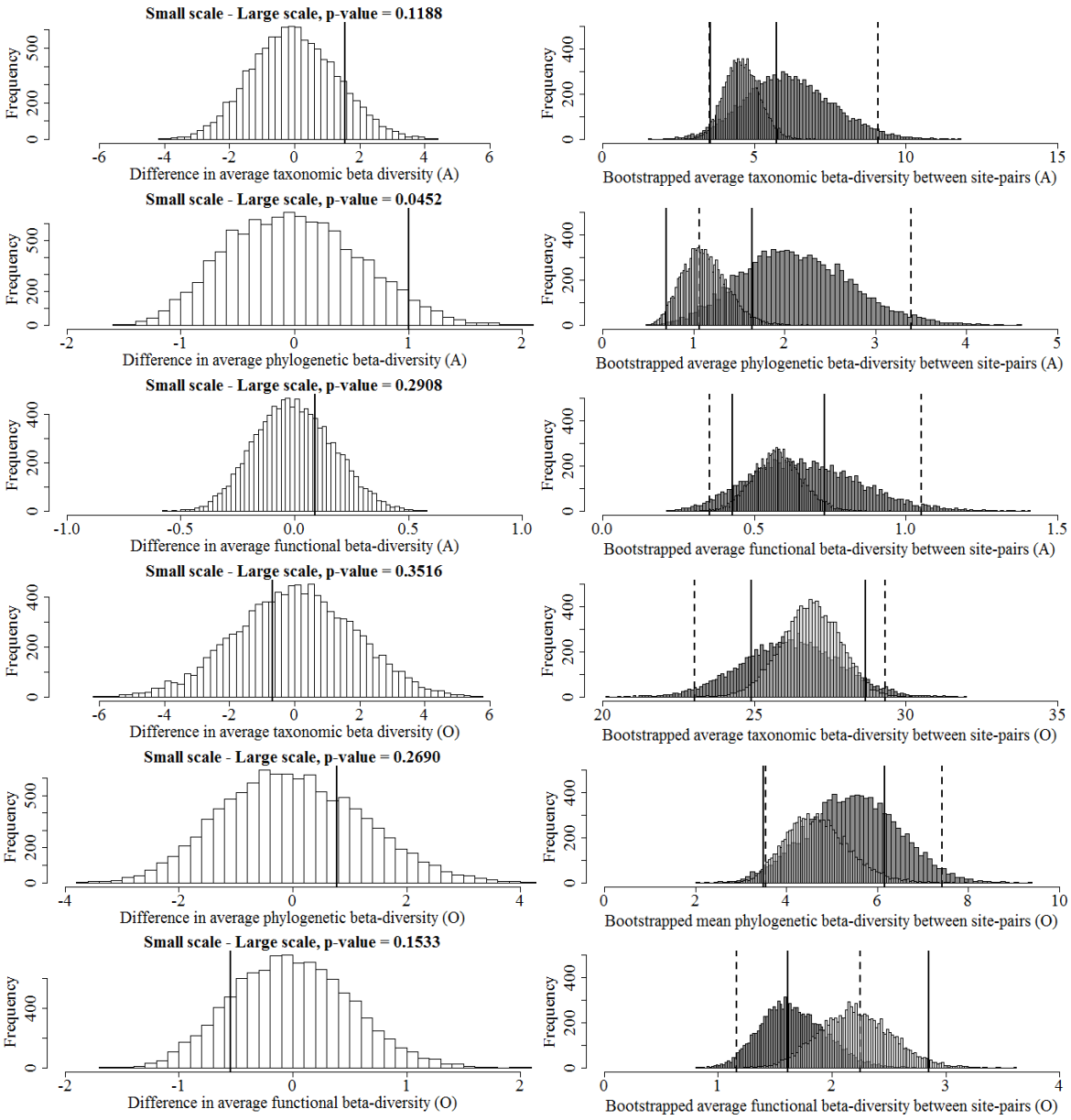
Supplementary material Appendix 4, Fig. A4 showing the distribution of average dissimilarity in environmental conditions between site-pairs located closer to each other than 20 km (small scale; dark grey) and site-pairs located farther from each other than 100 km (large scale; light grey).

The average dissimilarity in altitude between sites was smaller at the small scale than at the large scale (panel 1).The distributions of the two scales overlapped in terms of similarity in landscape diversity, plant axis one and plant cover (panels 2-4). The distributions were calculated by calculating the euclidian distance between all site-pairs in terms of each environmental variable. Variable pairs were then grouped according to the geographic distances between pair-members. We then used the R-package *boot* (Canty and Ripley 2013) to calculate a boot-strapped distribution of averages within each scale through 10,000 permutations, with replacement. The line below each distribution, attaching it to the x-axis, shows the 95% quantile of the distribution.

Refferences

Canty, A. and Ripley, B. 2013. boot: Bootstrap R (S-Plus) Functions. R package version 1.3-9.

Supplementary material Appendix 5, Fig. A5.



Supplementary material Appendix 5, Fig. A5 showing the differences in average inter-site β-diversity between pairs of species assemblages located within 20 km of each other (small scale), and those located further than 100 km from each other (large scale). The differences were calculated for both abundance based and occurrence based β-diversity indexes marked with (A) and (O) respectively. The left column displays the observed differences in the average β-diversity between species assemblages in the small and in the large scale (dashed line). The p-values specify the proportion of differences from the null distribution that are higher than the absolute difference in the observed values. The right column displays the 95% confidence intervals calculated from the bootstrapped distribution of the average β-diversity between species assemblage-pairs in the small scale (filled lines) and the large scale (dashed lines).