Tables

Table 1: Values and significances[1] of coefficients from univariate regressions of vascular plant species richness against different axes of environmental heterogeneity[2] (log_{10}-transformed) and overall environmental heterogeneity (PC1) across the GCFR and SWAFR at the (a) QDS-, (b) HDS- and (c) DS-scales.

Response	Model type	Predictor	Main effect		SWAFR effect		SWAFR interaction	
(a) S_{QDS}	Main effect × region	MAP	192.1	***	66.4	**	-74.0	***
		NDVI	137.5	***	-42.1	*	-89.4	***
		Soil C	113.9	***	-4.2		-72.4	**
		PC1	79.4	***	89.6	***	-24.6	*
	Main effect + region	Elevation	96.9	***	72.6	**		
		PDQ	112.1	***	57.6	*		
		CEC	25.0	*	-50.5	*		
		Clay	27.0	**	-53.4	*		
	Main effect only	Surface T	74.6	***				
	Region only	pH	18.5	~	-53.6	*		
(b) S_{HDS}	Main effect only	Elevation	119.3	**				
		MAP	266.1	***				
		PDQ	189.4	***				
		Surface T	130.6	***				
		NDVI	253.6	***				
		Clay	129.7	***				
		Soil C	140.3	***				
		pH	54.4					
		PC1	131.0	***				
	Region only	CEC	-13.4		-161.4	*		
(c) S_{DS}	Main effect only	Elevation	289.5	**				
		MAP	535.4	***				
		PDQ	441.9	***				
		NDVI	400.6	**				
		Clay	405.8	***				
		PC1	247.5	***				
	Region only	Surface T	197.7	~	-484.0	*		
		CEC	-29.8		-564.0	*		
		Soil C	181.3		-474.2	*		
		pH	95.1		-511.6	*		

[1] Represented as follows: ***, $P < 0.001$; **, $P < 0.01$; *, $P < 0.05$; ~, $P < 0.1$; blank, NS.

[2] Abbreviations are as follows: NDVI, normalized difference vegetation index; T, temperature; MAP, mean annual precipitation; PDQ, precipitation in the driest quarter; CEC, cation exchange capacity; C, carbon.

454 **Table 2:** Pearson's *r* correlation coefficients comparing the predicted and residual species
455 richness (*S*) between the PC1-based ANCOVAs (Table 1, Figure 4) and the multivariate
456 regressions (Figure 5). All correlation coefficients were significant ($P < 0.001$; two-sided *t*-test).

	Correlation	
Spatial scale	Predicted *S*	Residual *S*
QDS	0.743	0.934
HDS	0.711	0.878
DS	0.638	0.656

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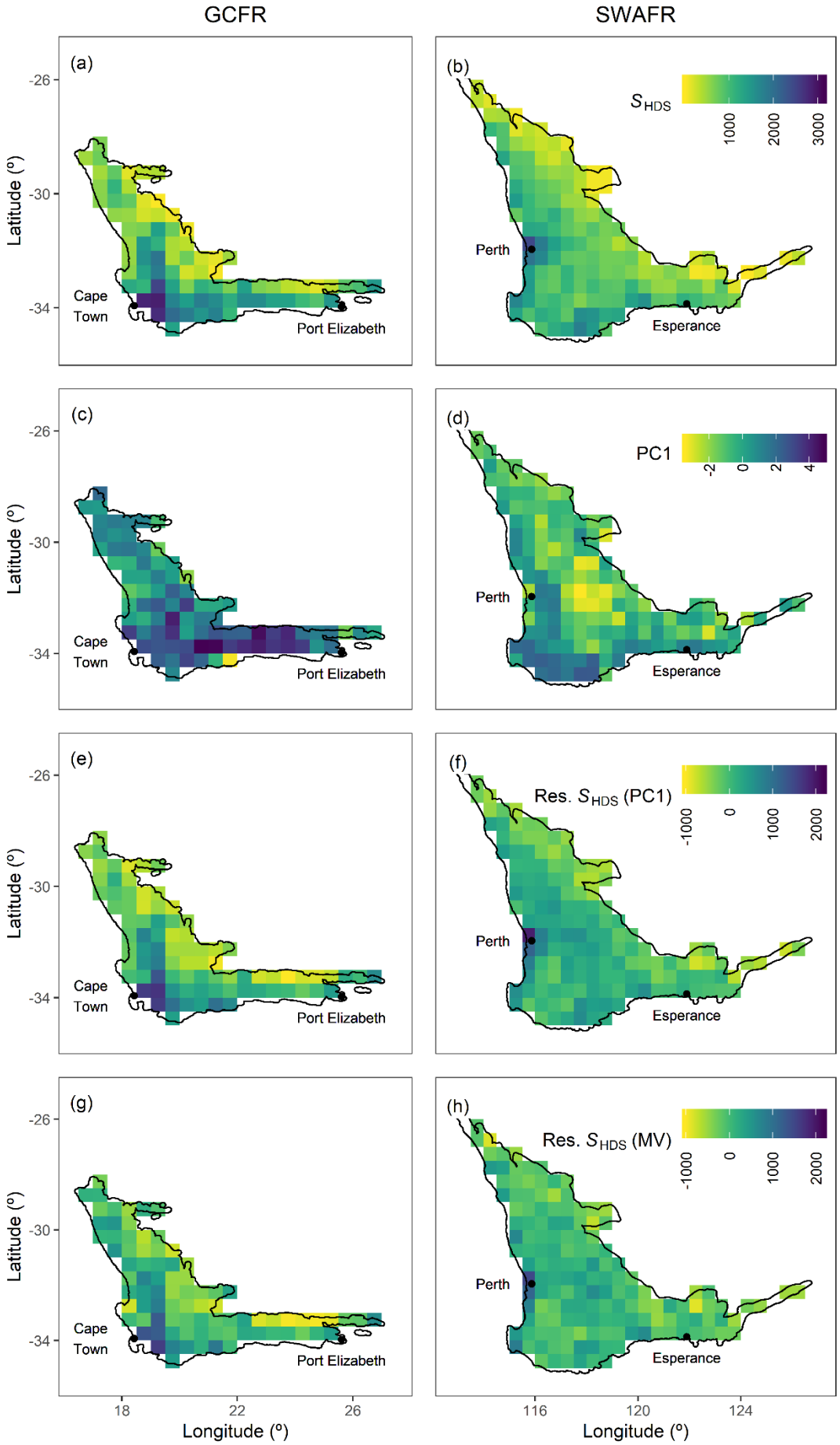
Figures

Figure 1 (next page): HDS-scale maps for the GCFR and SWAFR of (a,b) vascular plant species richness, (c,d) the major axis of environmental heterogeneity (PC1) from the PCA of nine forms of environmental heterogeneity (log_{10}-transformed), residuals from regressions of species richness against (e,f) PC1 (Figure 4b) and (g,h) the multivariate (MV) model (Figure 5b). Map projection used: WGS84. Colour versions of these maps, and the QDS- and DS-scale equivalents (Figure S9, S10 respectively) are available in the online version.


GCFR
SWAFR
(a)
(b)
(c)
(d)
(e)
(f)
(g)
(h)
Latitude (°)
-26
-30
-34
Cape Town
Port Elizabeth
Perth
Esperance
S_{HDS}
1000
2000
3000
PC1
-2
0
2
4
Res. S_{HDS} (PC1)
Res. S_{HDS} (MV)
-1000
0
1000
2000
18
22
26
116
120
124
Longitude (°)

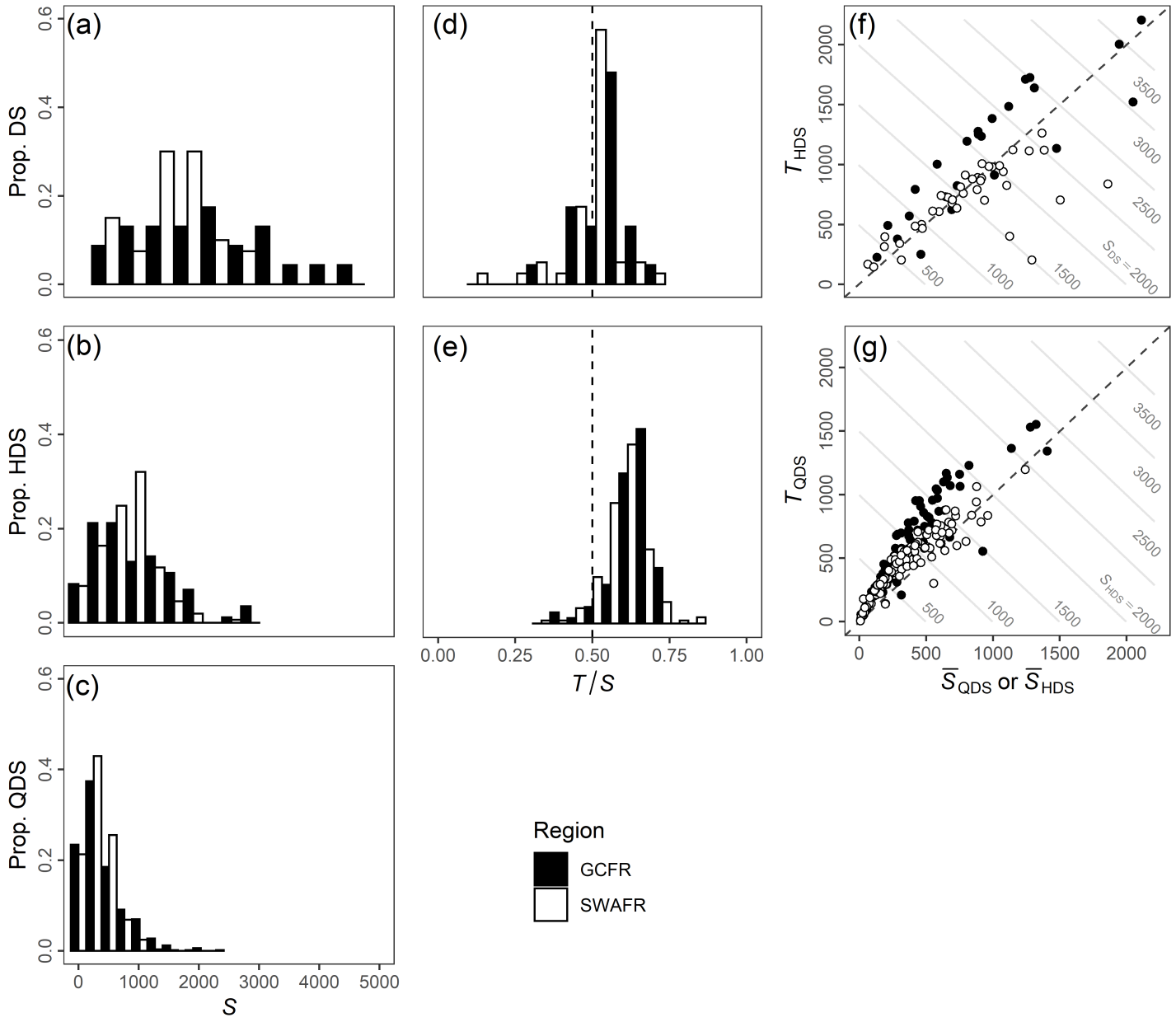
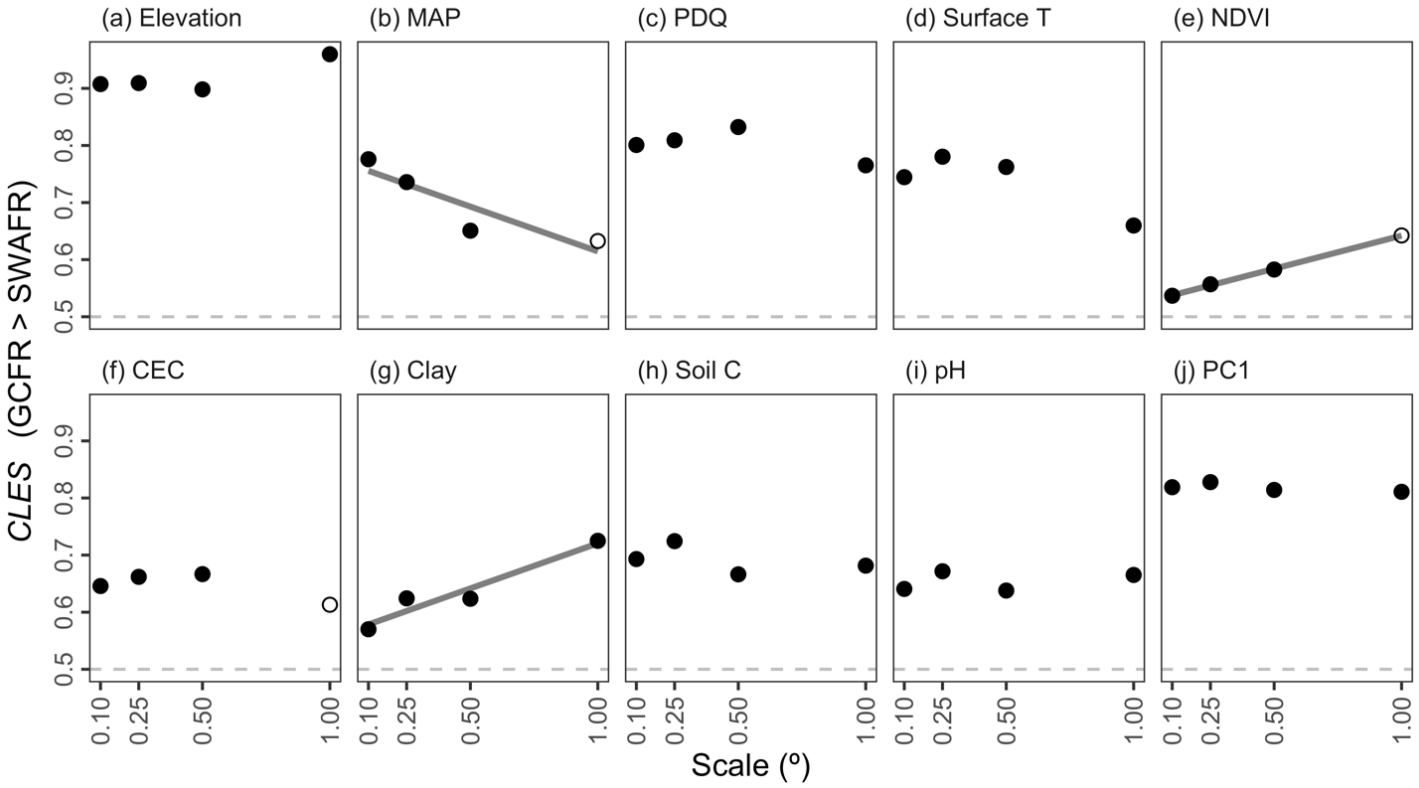


Figure 2: Frequency distributions of vascular plant species richness in the GCFR and SWAFR at the (a) DS-, (b) HDS-, and (c) QDS-scales, and of the proportional contributions of floristic turnover (T/S) to (d) S_{DS} (i.e. T_{HDS} / S_{DS}) and (e) S_{HDS}. (i.e. T_{QDS} / S_{HDS}). Frequencies are scaled as the proportions of cells within each region. The derivations of T_{DS} and T_{HDS} are demonstrated with scatter plots of mean (f) HDS- and (g) QDS-scale richness ($\overline{S}_{HDS}$ and $\overline{S}_{QDS}$ respectively) against turnover ((f) T_{HDS} and (g) T_{QDS}) with contour lines denoting the S_{DS} and S_{HDS} that arise as their sums.



475

476 **Figure 3:** The common language effect size (*CLES*) of (a–i) various forms of environmental
477 heterogeneity (log_{10}-transformed) and (j) the major axis thereof (PC1) in the GCFR and SWAFR.
478 *CLES* here is treated as the effect of GCFR relative to SWAFR values. Filled points represent
479 comparisons where the GCFR and SWAFR significantly differed in heterogeneity ($P < 0.05$;
480 two-sided Mann-Whitney *U*-tests), while unfilled points represent those that were not significant.
481 Following simple linear regressions of *CLES* against scale, we found some evidence for
482 relationships (depicted by lines) for MAP (slope = –0.157; $P = 0.098$), NDVI (slope = 0.116; $P <$
483 0.001) and Clay (slope = 0.158, $P = 0.037$). Abbreviations are as in Table 1.

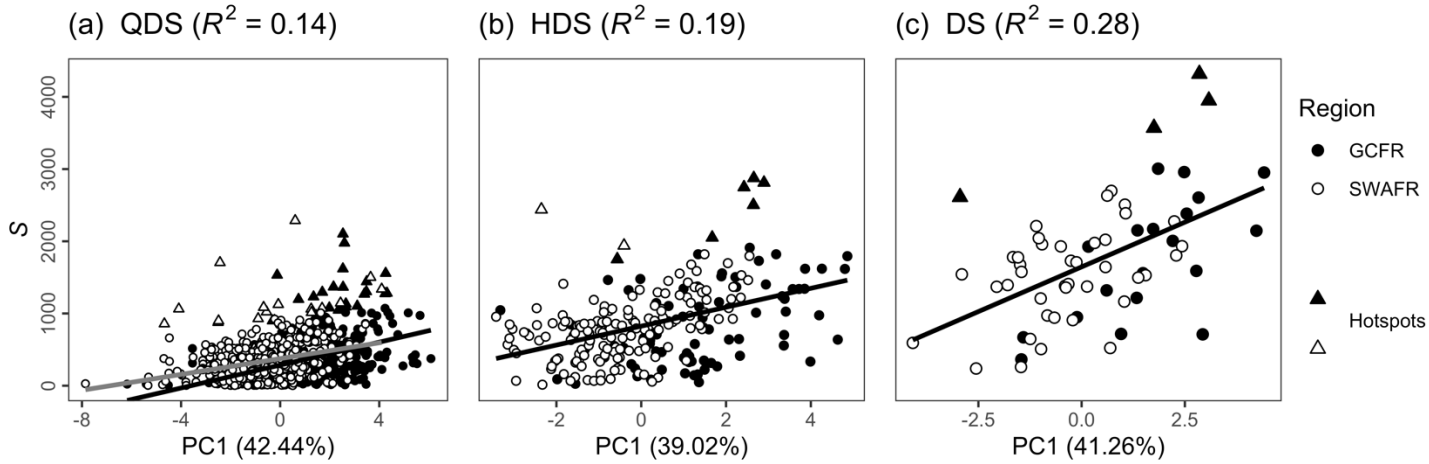
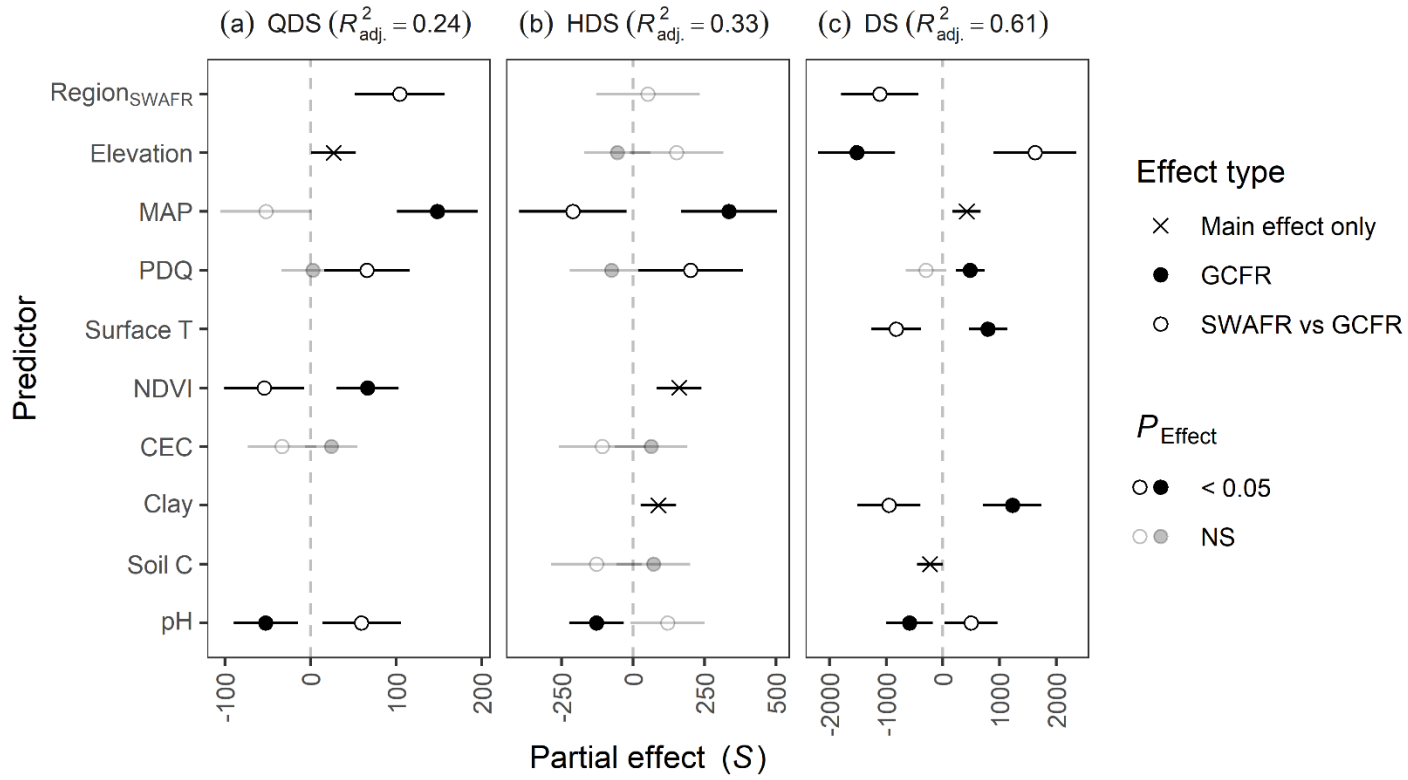


Figure 4: Simple linear regressions of vascular plant species richness as (a) S_{QDS}, (b) S_{HDS} and (c) S_{DS} against each respective scale's major axis of environmental heterogeneity (PC1) across the GCFR and SWAFR. Grid-cells representing hotspots of species richness (identified as having residual *S* greater than two standard deviations from the mean) are identified by triangles (black for the GCFR, white for SWAFR, as with round points). These three linear models are presented in Table 1, all with highly significant slopes ($P < 0.001$) and were fitted including species richness hotspots. For S_{QDS}, the separate fits for the GCFR (black) and SWAFR (grey) are presented, following the best fitting model at that scale (see Table 1a). The R^2-values of each model and the variation in environmental heterogeneity explained by PC1 from each of the three PCAs are noted in parentheses in the panel and horizontal axis headings respectively. The equivalent results when hotpots were excluded is available in the online version (Figure S7).



497

498 **Figure 5:** Slope estimates from multiple linear regressions of vascular plant species richness as
499 (a) S_{QDS}, (b) S_{HDS} and (c) S_{DS} against the various forms of environmental heterogeneity (log_{10}-
500 transformed and re-scaled) across GCFR and SWAFR. Points with error bars denote partial
501 effect estimates and their 95% confidence intervals. Filled and empty points represent effect
502 estimates for the GCFR and SWAFR respectively when region-interaction terms were retained
503 during stepwise model selection, while crosses represent main effects (i.e. no region-interaction
504 term retained). Estimates illustrated in black were significant ($P < 0.05$), while those in grey
505 were not, but still retained during stepwise model selection. The multiple adjusted R^2-values of
506 each model are noted in parentheses in the panel headings. Abbreviations of variables are as in
507 Table 1 and Figure 3. The equivalent results when hotpots were excluded is available in the
508 online version (Figure S8).