

1 **Supplementary material**
 2

3 **Table A1.** 4-factor PERMANOVA pairwise test results for significant double and three-way interactions based on the community structure data.
 4 Ar: area; WD: water depth; SD: sediment depth; perms: possible; permutations; P(MC): Monte-Carlo p-values. Bold P(MC) values: $p < 0.05$; bold,
 5 italic values: $p < 0.01$. Gol: Gollum channels; Whi: Whittard Cayon; Cas: Cascais Canyon; Set: Setúbal Canyon; Naz: Nazaré Canyon
 6

Irish Margin					Western Iberian Margin					Irish Margin					Western Iberian Margin				
Double interactions					Double interactions					Three-way interactions					Three-way interactions				
Within WD	Comparisons	t	perms	P(MC)	Within WD	Comparisons	t	perms	P(MC)	Within WD x SD	Comparisons	t	perms	P(MC)	Within WD x SD	Comparisons	t	perms	P(MC)
1000	Gol, Whi	2.374	10	0.001	3400	Cas, Naz	2.696	689	0.001	1000, 0-1	Gol, Whi	1.708	10	0.066	3400, 0-1	Cas, Naz	2.086	84	0.012
1000	0-1, 1-2	1.686	970	0.071	3400	Cas, Set	2.356	10	0.001	1000, 1-2	Gol, Whi	1.961	10	0.038	3400, 0-1	Cas, Set	1.161	10	0.298
1000	0-1, 2-3	1.902	984	0.042	3400	Cas, Slope	2.224	20	0.007	1000, 2-3	Gol, Whi	2.043	10	0.037	3400, 0-1	Cas, Slope	1.803	10	0.050
1000	0-1, 3-4	2.308	976	0.025	3400	Naz, Set	2.270	682	0.001	1000, 3-4	Gol, Whi	1.779	10	0.063	3400, 0-1	Naz, Set	2.377	84	0.007
1000	0-1, 4-5	2.290	976	0.017	3400	Naz, Slope	1.845	681	0.013	1000, 4-5	Gol, Whi	1.466	10	0.101	3400, 0-1	Naz, Slope	2.442	84	0.006
1000	1-2, 2-3	1.292	975	0.185	3400	Set, Slope	2.131	20	0.009	700, 0-1	Gol, Whi	1.336	10	0.175	3400, 0-1	Set, Slope	2.145	10	0.026
1000	1-2, 3-4	1.637	978	0.075	3400	0-1, 1-2	1.462	999	0.085	700, 1-2	Gol, Whi	1.511	10	0.097	3400, 1-2	Cas, Naz	2.027	35	0.022
1000	1-2, 4-5	2.133	968	0.018	3400	0-1, 2-3	1.980	999	0.016	700, 2-3	Gol, Whi	1.577	10	0.092	3400, 1-2	Cas, Set	1.477	10	0.132
1000	2-3, 3-4	1.153	979	0.297	3400	0-1, 3-4	2.107	999	0.004	700, 3-4	Gol, Whi	1.839	10	0.072	3400, 1-2	Cas, Slope	1.843	4	0.128
1000	2-3, 4-5	1.604	974	0.096	3400	0-1, 4-5	2.069	998	0.007	700, 4-5	Gol, Whi	1.928	10	0.045	3400, 1-2	Naz, Set	1.926	35	0.023
1000	3-4, 4-5	1.344	977	0.169	3400	1-2, 2-3	1.288	997	0.149	<u>Within Ar x SD</u>					3400, 1-2	Naz, Slope	1.367	5	0.208
700	Gol, Whi	2.241	60	0.001	3400	1-2, 3-4	1.620	999	0.040	Gol, 0-1	1000, 700	1.098	10	0.344	3400, 1-2	Set, Slope	1.666	4	0.166
700	0-1, 1-2	1.992	970	0.031	3400	1-2, 4-5	1.697	998	0.037	Gol, 1-2	1000, 700	1.146	10	0.312	3400, 2-3	Cas, Naz	2.036	35	0.022
700	0-1, 2-3	2.166	969	0.017	3400	2-3, 3-4	1.180	998	0.210	Gol, 2-3	1000, 700	1.330	10	0.192	3400, 2-3	Cas, Set	1.601	10	0.098
700	0-1, 3-4	2.684	998	0.019	3400	2-3, 4-5	1.434	999	0.075	Gol, 3-4	1000, 700	1.290	10	0.234	3400, 2-3	Cas, Slope	1.703	4	0.151
700	0-1, 4-5	2.643	975	0.008	3400	3-4, 4-5	0.981	999	0.460	Gol, 4-5	1000, 700	1.265	10	0.206	3400, 2-3	Naz, Set	1.827	35	0.024
700	1-2, 2-3	1.373	974	0.158	4300	Cas, Naz	2.018	20	0.009	Whi, 0-1	1000, 700	1.772	10	0.043	3400, 2-3	Naz, Slope	1.385	5	0.186
700	1-2, 3-4	1.778	998	0.087	4300	Cas, Set	1.501	10	0.027	Whi, 1-2	1000, 700	1.662	10	0.053	3400, 2-3	Set, Slope	1.423	4	0.256
700	1-2, 4-5	1.973	974	0.035	4300	Cas, Slope	1.963	20	0.009	Whi, 2-3	1000, 700	2.184	10	0.020	3400, 3-4	Cas, Naz	2.148	35	0.009
700	2-3, 3-4	1.248	998	0.236	4300	Naz, Set	2.087	20	0.008	Whi, 3-4	1000, 700	2.313	10	0.018	3400, 3-4	Cas, Set	2.104	10	0.018
700	2-3, 4-5	1.401	974	0.140	4300	Naz, Slope	1.845	10	0.055	Whi, 4-5	1000, 700	2.141	10	0.026	3400, 3-4	Cas, Slope	1.921	4	0.122
700	3-4, 4-5	1.118	997	0.328	4300	Set, Slope	1.915	20	0.013	<u>Within Ar x WD</u>					3400, 3-4	Naz, Set	1.969	35	0.027
<u>Within Ar</u>					<u>Within Ar</u>					<u>Within Ar</u>					<u>Within Ar</u>				
Gol	1000, 700	1.545	60	0.029	4300	0-1, 1-2	1.452	997	0.138	Gol, 1000	0-1, 1-2	1.913	38	0.112	3400, 3-4	Naz, Slope	1.656	5	0.083
Gol	0-1, 1-2	2.164	978	0.027	4300	0-1, 2-3	1.820	998	0.049	Gol, 1000	0-1, 2-3	1.669	38	0.165	3400, 3-4	Set, Slope	1.956	4	0.117
Gol	0-1, 2-3	2.070	973	0.027	4300	0-1, 3-4	1.890	998	0.043	Gol, 1000	0-1, 3-4	1.948	38	0.113	3400, 4-5	Cas, Naz	1.685	35	0.049
Gol	0-1, 3-4	2.126	998	0.048	4300	0-1, 4-5	2.452	999	0.019	Gol, 1000	0-1, 4-5	1.821	38	0.118	3400, 4-5	Cas, Set	1.839	10	0.046
Gol	0-1, 4-5	2.177	978	0.029	4300	1-2, 2-3	1.823	998	0.047	Gol, 1000	1-2, 2-3	1.211	38	0.308	3400, 4-5	Cas, Slope	1.957	4	0.102
Gol	1-2, 2-3	1.451	978	0.146	4300	1-2, 3-4	1.236	998	0.232	Gol, 1000	1-2, 3-4	1.397	38	0.237	3400, 4-5	Naz, Set	1.440	35	0.107
Gol	1-2, 3-4	1.729	998	0.095	4300	1-2, 4-5	1.897	999	0.039	Gol, 1000	1-2, 4-5	1.852	38	0.122	3400, 4-5	Naz, Slope	1.478	5	0.164
Gol	1-2, 4-5	2.125	981	0.022	4300	2-3, 3-4	0.962	999	0.467	Gol, 1000	2-3, 3-4	1.161	38	0.359	3400, 4-5	Set, Slope	1.854	4	0.127
Gol	2-3, 3-4	1.143	998	0.296	4300	2-3, 4-5	1.600	999	0.077	Gol, 1000	2-3, 4-5	1.523	38	0.191	4300, 0-1	Cas, Naz	1.973	10	0.030
Gol	2-3, 4-5	1.558	980	0.092	4300	3-4, 4-5	1.027	998	0.393	Gol, 1000	3-4, 4-5	1.169	38	0.352	4300, 0-1	Cas, Set	0.996	10	0.429
Gol	3-4, 4-5	1.032	998	0.441	Cas	<u>Within Ar</u>		<u>Within Ar</u>		Gol, 700	0-1, 1-2	1.599	38	0.171	4300, 0-1	Cas, Slope	1.727	10	0.061
Whi	1000, 700	2.722	10	0.002	Cas	3400, 4300	1.363	10	0.083	Gol, 700	0-1, 2-3	1.612	38	0.164	4300, 0-1	Naz, Set	2.014	10	0.032
Whi	0-1, 1-2	1.556	977	0.091	Cas	0-1, 1-2	1.334	980	0.182	Gol, 700	0-1, 3-4	1.508	15	0.318	4300, 0-1	Naz, Slope	1.755	10	0.057
					Cas	0-1, 2-3	1.684	967	0.072	Gol, 700	0-1, 4-5	1.718	38	0.115	4300, 0-1	Set, Slope	1.728	10	0.058

Whi	0-1, 2-3	2.235	974	0.026	Cas	0-1, 3-4	2.182	976	0.026	Gol, 700	1-2, 2-3	1.309	38	0.284	4300, 1-2	Cas, Naz	1.524	4	0.172
Whi	0-1, 3-4	2.866	981	0.008	Cas	0-1, 4-5	2.405	973	0.013	Gol, 700	1-2, 3-4	1.532	15	0.297	4300, 1-2	Cas, Set	1.253	10	0.239
Whi	0-1, 4-5	2.715	979	0.012	Cas	1-2, 2-3	1.552	966	0.101	Gol, 700	1-2, 4-5	1.519	38	0.175	4300, 1-2	Cas, Slope	1.638	4	0.150
Whi	1-2, 2-3	1.518	972	0.102	Cas	1-2, 3-4	1.823	972	0.054	Gol, 700	2-3, 3-4	0.979	15	0.482	4300, 1-2	Naz, Set	1.574	4	0.176
Whi	1-2, 3-4	1.853	978	0.050	Cas	1-2, 4-5	1.941	975	0.031	Gol, 700	2-3, 4-5	1.143	38	0.380	4300, 1-2	Set, Slope	1.574	4	0.184
Whi	1-2, 4-5	2.146	978	0.028	Cas	2-3, 3-4	1.376	977	0.150	Gol, 700	3-4, 4-5	0.982	15	0.537	4300, 2-3	Cas, Naz	1.893	4	0.104
Whi	2-3, 3-4	1.343	984	0.160	Cas	2-3, 4-5	1.745	967	0.064	Whi, 1000	0-1, 1-2	1.114	38	0.378	4300, 2-3	Cas, Set	1.114	10	0.318
Whi	2-3, 4-5	1.605	981	0.091	Cas	3-4, 4-5	1.312	974	0.206	Whi, 1000	0-1, 2-3	2.124	38	0.084	4300, 2-3	Cas, Slope	1.702	4	0.150
Whi	3-4, 4-5	1.347	973	0.159	Naz	3400, 4300	1.661	681	0.027	Whi, 1000	0-1, 3-4	1.909	38	0.099	4300, 2-3	Naz, Set	1.928	4	0.102
Within SD	Comparisons	t	perms	P(MC)	Naz	0-1, 1-2	1.253	997	0.239	Whi, 1000	0-1, 4-5	1.920	38	0.113	4300, 2-3	Set, Slope	1.817	4	0.138
0-1	Gol, Whi	1.642	982	0.031	Naz	0-1, 2-3	1.762	998	0.082	Whi, 1000	1-2, 2-3	1.561	38	0.189	4300, 3-4	Cas, Naz	2.158	4	0.075
1-2	Gol, Whi	1.959	985	0.005	Naz	0-1, 3-4	1.718	999	0.091	Whi, 1000	1-2, 3-4	1.558	38	0.192	4300, 3-4	Cas, Set	1.137	10	0.315
2-3	Gol, Whi	1.684	986	0.014	Naz	0-1, 4-5	1.661	998	0.116	Whi, 1000	1-2, 4-5	1.745	38	0.144	4300, 3-4	Cas, Slope	1.904	4	0.108
3-4	Gol, Whi	1.517	986	0.049	Naz	1-2, 2-3	1.268	984	0.245	Whi, 1000	2-3, 3-4	1.054	38	0.425	4300, 3-4	Naz, Set	1.784	4	0.135
4-5	Gol, Whi	1.557	990	0.040	Naz	1-2, 3-4	1.131	986	0.359	Whi, 1000	2-3, 4-5	1.328	38	0.266	4300, 3-4	Set, Slope	1.667	4	0.144
0-1	1000, 700	1.537	985	0.038	Naz	1-2, 4-5	1.213	985	0.288	Whi, 1000	3-4, 4-5	1.335	38	0.271	4300, 4-5	Cas, Naz	1.715	4	0.136
1-2	1000, 700	1.432	981	0.066	Naz	2-3, 3-4	1.100	983	0.350	Whi, 700	0-1, 1-2	1.578	38	0.194	4300, 4-5	Cas, Set	1.174	10	0.296
2-3	1000, 700	1.589	980	0.035	Naz	2-3, 4-5	0.920	982	0.468	Whi, 700	0-1, 2-3	2.017	38	0.100	4300, 4-5	Cas, Slope	1.866	4	0.123
3-4	1000, 700	1.414	983	0.084	Naz	3-4, 4-5	0.747	986	0.677	Whi, 700	0-1, 3-4	3.101	38	0.033	4300, 4-5	Naz, Set	2.070	4	0.084
4-5	1000, 700	1.598	985	0.035	Set	3400, 4300	2.689	10	0.001	Whi, 700	0-1, 4-5	2.669	38	0.055	4300, 4-5	Set, Slope	1.961	4	0.090
					Set	0-1, 1-2	1.571	974	0.094	Whi, 700	1-2, 2-3	1.385	38	0.267	Within Ar x SD	Comparisons	t	perms	P(MC)
					Set	0-1, 2-3	2.030	971	0.033	Whi, 700	1-2, 3-4	1.724	38	0.120	Cas, 0-1	3400, 4300	0.817	10	0.633
					Set	0-1, 3-4	2.229	980	0.027	Whi, 700	1-2, 4-5	1.958	38	0.109	Cas, 1-2	3400, 4300	1.444	10	0.136
					Set	0-1, 4-5	2.240	969	0.027	Whi, 700	2-3, 3-4	1.200	38	0.331	Cas, 2-3	3400, 4300	1.209	10	0.271
					Set	1-2, 2-3	1.587	977	0.077	Whi, 700	2-3, 4-5	1.327	38	0.236	Cas, 3-4	3400, 4300	0.951	10	0.501
					Set	1-2, 3-4	1.776	973	0.045	Whi, 700	3-4, 4-5	1.097	38	0.372	Cas, 4-5	3400, 4300	1.274	10	0.212
					Set	1-2, 4-5	1.979	971	0.036					Naz, 0-1	3400, 4300	2.342	84	0.005	
					Set	2-3, 3-4	1.078	978	0.337					Naz, 1-2	3400, 4300	1.612	5	0.119	
					Set	2-3, 4-5	1.444	977	0.136					Naz, 2-3	3400, 4300	1.551	5	0.139	
					Set	3-4, 4-5	1.246	980	0.228					Naz, 3-4	3400, 4300	1.613	5	0.108	
					Slope	3400, 4300	1.457	10	0.101					Naz, 4-5	3400, 4300	1.361	5	0.204	
					Within SD	Comparisons	t	perms	P(MC)					Set, 0-1	3400, 4300	1.261	10	0.227	
					0-1	Cas, Naz	2.351	998	0.003					Set, 1-2	3400, 4300	1.651	10	0.072	
					0-1	Cas, Set	1.096	980	0.294					Set, 2-3	3400, 4300	1.641	10	0.075	
					0-1	Cas, Slope	2.348	990	0.004					Set, 3-4	3400, 4300	2.023	10	0.029	
					0-1	Naz, Set	2.445	999	0.001					Set, 4-5	3400, 4300	2.086	10	0.024	
					0-1	Naz, Slope	2.257	999	0.001					Slope, 0-1	3400, 4300	1.108	10	0.300	
					0-1	Set, Slope	2.536	984	0.002					Within Ar x WD	Comparisons	t	perms	P(MC)	
					0-1	3400, 4300	1.484	998	0.018					Cas, 3400	0-1, 1-2	1.369	38	0.228	
					1-2	Cas, Naz	1.621	972	0.039					Cas, 3400	0-1, 2-3	1.453	38	0.189	
					1-2	Cas, Set	1.118	988	0.291					Cas, 3400	0-1, 3-4	1.897	38	0.118	
					1-2	Cas, Slope	2.085	174	0.035					Cas, 3400	0-1, 4-5	2.034	38	0.095	
					1-2	Naz, Set	1.500	970	0.059					Cas, 3400	1-2, 2-3	1.587	38	0.166	
					1-2	Naz, Slope	1.262	70	0.271					Cas, 3400	1-2, 3-4	1.789	38	0.143	
					1-2	Set, Slope	1.932	172	0.039					Cas, 3400	1-2, 4-5	1.691	38	0.158	
					1-2	3400, 4300	1.494	999	0.036					Cas, 3400	2-3, 3-4	1.167	38	0.332	
					2-3	Cas, Naz	2.057	969	0.017					Cas, 3400	2-3, 4-5	1.402	38	0.240	

2-3	Cas, Set	1.361	981	0.102
2-3	Cas, Slope	1.928	172	0.042
2-3	Naz, Set	1.729	970	0.036
2-3	Naz, Slope	1.386	70	0.184
2-3	Set, Slope	1.776	171	0.053
2-3	3400, 4300	1.430	999	0.044
3-4	Cas, Naz	2.166	975	0.005
3-4	Cas, Set	1.598	987	0.043
3-4	Cas, Slope	2.416	171	0.022
3-4	Naz, Set	1.720	969	0.025
3-4	Naz, Slope	1.360	70	0.205
3-4	Set, Slope	2.149	172	0.026
3-4	3400, 4300	1.374	997	0.079
4-5	Cas, Naz	1.767	970	0.027
4-5	Cas, Set	1.226	982	0.201
4-5	Cas, Slope	2.403	175	0.015
4-5	Naz, Set	1.278	974	0.167
4-5	Naz, Slope	1.348	70	0.223
4-5	Set, Slope	2.276	173	0.015
4-5	3400, 4300	1.342	999	0.098

Cas, 3400	3-4, 4-5	1.390	38	0.254
Cas, 4300	0-1, 1-2	1.226	38	0.290
Cas, 4300	0-1, 2-3	1.271	38	0.307
Cas, 4300	0-1, 3-4	1.477	38	0.229
Cas, 4300	0-1, 4-5	1.751	38	0.138
Cas, 4300	1-2, 2-3	1.310	38	0.258
Cas, 4300	1-2, 3-4	1.055	38	0.399
Cas, 4300	1-2, 4-5	1.450	38	0.233
Cas, 4300	2-3, 3-4	0.980	38	0.444
Cas, 4300	2-3, 4-5	1.542	38	0.192
Cas, 4300	3-4, 4-5	0.981	38	0.473
Naz, 3400	0-1, 1-2	1.080	901	0.372
Naz, 3400	0-1, 2-3	1.914	904	0.082
Naz, 3400	0-1, 3-4	1.952	911	0.049
Naz, 3400	0-1, 4-5	1.615	924	0.131
Naz, 3400	1-2, 2-3	1.365	366	0.177
Naz, 3400	1-2, 3-4	1.560	363	0.142
Naz, 3400	1-2, 4-5	1.285	374	0.220
Naz, 3400	2-3, 3-4	0.997	367	0.444
Naz, 3400	2-3, 4-5	0.922	363	0.490
Naz, 3400	3-4, 4-5	0.788	373	0.610
Set, 3400	0-1, 1-2	1.708	38	0.152
Set, 3400	0-1, 2-3	1.805	38	0.147
Set, 3400	0-1, 3-4	2.732	38	0.047
Set, 3400	0-1, 4-5	2.107	38	0.103
Set, 3400	1-2, 2-3	1.560	38	0.173
Set, 3400	1-2, 3-4	2.425	38	0.056
Set, 3400	1-2, 4-5	2.134	38	0.094
Set, 3400	2-3, 3-4	1.334	38	0.235
Set, 3400	2-3, 4-5	1.638	38	0.160
Set, 3400	3-4, 4-5	1.379	38	0.233
Set, 4300	0-1, 1-2	1.207	38	0.345
Set, 4300	0-1, 2-3	1.435	38	0.247
Set, 4300	0-1, 3-4	1.231	38	0.326
Set, 4300	0-1, 4-5	1.580	38	0.204
Set, 4300	1-2, 2-3	1.561	38	0.175
Set, 4300	1-2, 3-4	1.112	38	0.393
Set, 4300	1-2, 4-5	1.285	38	0.302
Set, 4300	2-3, 3-4	0.839	38	0.565
Set, 4300	2-3, 4-5	1.142	38	0.355
Set, 4300	3-4, 4-5	0.848	38	0.583

8
9
10
11

Table A2. 4-factor PERMANOVA pairwise test results for significant double and three-way interactions based on diversity data . Ar: area; WD: water depth; SD: sediment depth; perms: possible; permutations; P(MC): Monte-Carlo p-values. Bold P(MC) values: $p < 0.05$; bold, italic values: $p < 0.01$. Gol: Gollum channels; Whi: Whittard Cayon; Cas: Cascais Canyon; Set: Setúbal Canyon; Naz: Nazaré Canyon.

Irish Margin						Irish Margin					Western Iberian Margin							
Double interactions						Three-way interactions					Three-way interactions							
Within WD	Comparisons	t	P(perm)	perms	P(MC)	Within WD x SD	Comparisons	t	P(perm)	perms	P(MC)	Within WD x SD	Comparisons	t	P(perm)	perms	P(MC)	
1000	Gol, Whi	2.828	0.082	10	0.012	1000, 0-1	Gol, Whi	3.719	0.100	10	0.010	3400, 0-1	Cas, Naz	2.123	0.051	84	0.037	
1000	0-1, 1-2	4.207	0.012	967	0.006	1000, 1-2	Gol, Whi	1.418	0.319	10	0.211	3400, 0-1	Cas, Set	0.403	0.900	10	0.835	
1000	0-1, 2-3	3.199	0.030	970	0.021	1000, 2-3	Gol, Whi	1.407	0.306	10	0.196	3400, 0-1	Cas, Slope	0.271	1.000	10	0.963	
1000	0-1, 3-4	2.715	0.048	973	0.039	1000, 3-4	Gol, Whi	1.803	0.216	10	0.121	3400, 0-1	Naz, Set	2.260	0.041	84	0.032	
1000	0-1, 4-5	2.589	0.029	969	0.032	1000, 4-5	Gol, Whi	1.243	0.295	10	0.270	3400, 0-1	Naz, Slope	2.027	0.053	84	0.033	
1000	1-2, 2-3	0.780	0.529	972	0.501	700, 0-1	Gol, Whi	1.245	0.206	10	0.287	3400, 0-1	Set, Slope	0.584	0.807	10	0.698	
1000	1-2, 3-4	0.864	0.512	980	0.472	700, 1-2	Gol, Whi	3.550	0.108	10	0.019	3400, 1-2	Cas, Naz	1.453	0.094	35	0.179	
1000	1-2, 4-5	1.363	0.214	981	0.216	700, 2-3	Gol, Whi	0.918	0.505	10	0.425	3400, 1-2	Cas, Set	1.639	0.202	10	0.153	
1000	2-3, 3-4	1.382	0.199	970	0.220	700, 3-4	Gol, Whi	2.257	0.093	10	0.097	3400, 1-2	Cas, Slope	3.890	0.256	4	0.024	
1000	2-3, 4-5	1.868	0.083	982	0.083	700, 4-5	Gol, Whi	2.582	0.110	10	0.063	3400, 1-2	Naz, Set	1.166	0.367	35	0.283	
1000	3-4, 4-5	1.375	0.232	971	0.208	Within Ar x SD					3400, 1-2	Naz, Slope	0.650	0.794	5	0.670		
700	Gol, Whi	1.584	0.200	60	0.167	Gol, 0-1	1000, 700	0.726	0.688	10	0.576	3400, 1-2	Set, Slope	0.720	0.765	4	0.597	
700	0-1, 1-2	1.572	0.173	974	0.184	Gol, 1-2	1000, 700	0.681	0.608	10	0.591	3400, 2-3	Cas, Naz	0.637	0.607	35	0.635	
700	0-1, 2-3	2.505	0.069	974	0.054	Gol, 2-3	1000, 700	1.880	0.206	10	0.122	3400, 2-3	Cas, Set	0.677	0.692	10	0.599	
700	0-1, 3-4	5.663	0.009	996	0.009	Gol, 3-4	1000, 700	1.226	0.272	10	0.291	3400, 2-3	Cas, Slope	0.252	1.000	4	0.923	
700	0-1, 4-5	3.993	0.021	975	0.009	Gol, 4-5	1000, 700	0.585	0.902	10	0.701	3400, 2-3	Naz, Set	0.944	0.374	35	0.383	
700	1-2, 2-3	1.920	0.120	968	0.113	Whi, 0-1	1000, 700	3.398	0.098	10	0.021	3400, 2-3	Naz, Slope	0.417	0.796	5	0.841	
700	1-2, 3-4	2.499	0.071	998	0.066	Whi, 1-2	1000, 700	4.197	0.103	10	0.007	3400, 2-3	Set, Slope	0.444	1.000	4	0.845	
700	1-2, 4-5	8.804	0.002	968	0.001	Whi, 2-3	1000, 700	1.483	0.195	10	0.218	3400, 3-4	Cas, Naz	1.852	0.107	35	0.109	
700	2-3, 3-4	1.583	0.193	998	0.183	Whi, 3-4	1000, 700	3.794	0.090	10	0.006	3400, 3-4	Cas, Set	1.938	0.103	10	0.124	
700	2-3, 4-5	3.813	0.013	966	0.003	Whi, 4-5	1000, 700	3.134	0.102	10	0.013	3400, 3-4	Cas, Slope	0.135	1.000	4	0.935	
700	3-4, 4-5	0.673	0.602	997	0.611	Within Ar x WD					3400, 3-4	Naz, Set	1.441	0.178	35	0.156		
Within Ar		Comparisons	t	P(perm)	perms	P(MC)	Gol, 1000	0-1, 1-2	6.129	0.095	38	0.019	3400, 3-4	Naz, Slope	1.667	0.202	5	0.153
Gol	1000, 700	2.708	0.045	60	0.031	Gol, 1000	0-1, 2-3	2.967	0.092	38	0.059	3400, 3-4	Set, Slope	3.807	0.251	4	0.041	
Gol	0-1, 1-2	4.178	0.015	969	0.020	Gol, 1000	0-1, 3-4	3.374	0.167	38	0.067	3400, 4-5	Cas, Naz	2.569	0.084	35	0.035	
Gol	0-1, 2-3	3.635	0.015	973	0.011	Gol, 1000	0-1, 4-5	2.845	0.158	38	0.089	3400, 4-5	Cas, Set	3.195	0.094	10	0.030	
Gol	0-1, 3-4	4.218	0.021	996	0.025	Gol, 1000	1-2, 2-3	0.061	1.000	38	0.993	3400, 4-5	Cas, Slope	0.927	0.753	4	0.483	
Gol	0-1, 4-5	2.979	0.035	975	0.025	Gol, 1000	1-2, 3-4	0.466	0.736	38	0.747	3400, 4-5	Naz, Set	0.608	0.704	35	0.694	
Gol	1-2, 2-3	0.666	0.553	970	0.565	Gol, 1000	1-2, 4-5	1.027	0.410	38	0.407	3400, 4-5	Naz, Slope	1.084	0.586	5	0.381	
Gol	1-2, 3-4	0.500	0.759	997	0.723	Gol, 1000	2-3, 3-4	0.735	0.671	38	0.612	3400, 4-5	Set, Slope	1.397	0.268	4	0.251	
Gol	1-2, 4-5	1.859	0.068	977	0.078	Gol, 1000	2-3, 4-5	1.403	0.273	38	0.256	4300, 0-1	Cas, Naz	1.549	0.078	10	0.164	
Gol	2-3, 3-4	1.152	0.370	999	0.325	Gol, 1000	3-4, 4-5	2.886	0.104	38	0.053	4300, 0-1	Cas, Set	0.540	0.906	10	0.766	
Gol	2-3, 4-5	2.518	0.028	982	0.037	Gol, 700	0-1, 1-2	2.167	0.261	38	0.169	4300, 0-1	Cas, Slope	2.048	0.206	10	0.080	
Gol	3-4, 4-5	0.776	0.497	994	0.495	Gol, 700	0-1, 2-3	2.190	0.228	38	0.149	4300, 0-1	Naz, Set	2.602	0.071	10	0.026	
Whi	1000, 700	3.241	0.106	10	0.004	Gol, 700	0-1, 3-4	3.450	0.243	15	0.178	4300, 0-1	Naz, Slope	4.142	0.119	10	0.006	
Whi	0-1, 1-2	1.825	0.092	969	0.086	Gol, 700	0-1, 4-5	1.924	0.220	38	0.168	4300, 0-1	Set, Slope	2.333	0.097	10	0.066	
Whi	0-1, 2-3	1.809	0.130	969	0.155	Gol, 700	1-2, 2-3	2.182	0.197	38	0.106	4300, 1-2	Cas, Naz	2.198	0.250	4	0.125	

Whi	0-1, 3-4	3.358	0.023	974	0.022	Gol, 700	1-2, 3-4	0.308	0.807	15	0.850	4300, 1-2	Cas, Set	1.489	0.227	10	0.182
Whi	0-1, 4-5	4.435	0.007	978	0.002	Gol, 700	1-2, 4-5	3.049	0.105	38	0.056	4300, 1-2	Cas, Slope	1.156	0.472	4	0.369
Whi	1-2, 2-3	3.170	0.040	973	0.015	Gol, 700	2-3, 3-4	0.849	0.639	15	0.561	4300, 1-2	Naz, Set	0.992	0.482	4	0.407
Whi	1-2, 3-4	5.372	0.004	973	0.001	Gol, 700	2-3, 4-5	3.018	0.096	38	0.051	4300, 1-2	Set, Slope	1.632	0.488	4	0.216
Whi	1-2, 4-5	6.765	0.004	978	0.001	Gol, 700	3-4, 4-5	0.281	0.936	15	0.859	4300, 2-3	Cas, Naz	1.078	0.498	4	0.405
Whi	2-3, 3-4	1.220	0.276	972	0.267	Whi, 1000	0-1, 1-2	1.132	0.331	38	0.388	4300, 2-3	Cas, Set	1.030	0.402	10	0.367
Whi	2-3, 4-5	2.383	0.053	977	0.042	Whi, 1000	0-1, 2-3	1.371	0.297	38	0.277	4300, 2-3	Cas, Slope	0.924	0.491	4	0.446
Whi	3-4, 4-5	3.444	0.009	971	0.010	Whi, 1000	0-1, 3-4	1.288	0.334	38	0.304	4300, 2-3	Naz, Set	1.680	0.252	4	0.178
Within SD	Comparisons	t	P(perm)	perms	P(MC)	Whi, 1000	0-1, 4-5	1.424	0.287	38	0.274	4300, 2-3	Set, Slope	1.185	0.480	4	0.335
0-1	Gol, Whi	3.210	0.008	978	0.008	Whi, 1000	1-2, 2-3	1.583	0.276	38	0.218	4300, 3-4	Cas, Naz	5.310	0.227	4	0.039
1-2	Gol, Whi	3.161	0.025	986	0.014	Whi, 1000	1-2, 3-4	1.108	0.280	38	0.394	4300, 3-4	Cas, Set	0.831	0.697	10	0.501
2-3	Gol, Whi	1.563	0.113	987	0.106	Whi, 1000	1-2, 4-5	1.707	0.188	38	0.187	4300, 3-4	Cas, Slope	4.632	0.252	4	0.041
3-4	Gol, Whi	0.617	0.682	987	0.659	Whi, 1000	2-3, 3-4	2.542	0.176	38	0.105	4300, 3-4	Naz, Set	2.635	0.259	4	0.103
4-5	Gol, Whi	2.193	0.031	989	0.041	Whi, 1000	2-3, 4-5	1.332	0.429	38	0.300	4300, 3-4	Set, Slope	2.192	0.250	4	0.122
0-1	1000, 700	2.297	0.047	979	0.035	Whi, 1000	3-4, 4-5	1.594	0.214	38	0.216	4300, 4-5	Cas, Naz	2.500	0.279	4	0.105
1-2	1000, 700	2.341	0.029	981	0.040	Whi, 700	0-1, 1-2	1.463	0.238	38	0.233	4300, 4-5	Cas, Set	0.451	0.831	10	0.769
2-3	1000, 700	2.340	0.045	988	0.055	Whi, 700	0-1, 2-3	1.388	0.277	38	0.286	4300, 4-5	Cas, Slope	1.588	0.239	4	0.244
3-4	1000, 700	0.421	0.845	987	0.834	Whi, 700	0-1, 3-4	4.757	0.087	38	0.033	4300, 4-5	Naz, Set	6.389	0.249	4	0.011
4-5	1000, 700	1.374	0.189	987	0.178	Whi, 700	0-1, 4-5	6.121	0.100	38	0.029	4300, 4-5	Set, Slope	3.870	0.271	4	0.024
Whi, 700	1-2, 2-3	2.923	0.107	38	0.100	Whi, 700	1-2, 2-3	2.923	0.107	38	0.100	Within Ar x SD	Comparisons	t	P(perm)	perms	P(MC)
Whi, 700	1-2, 3-4	10.189	0.092	38	0.005	Whi, 700	1-2, 3-4	10.189	0.092	38	0.005	Cas, 0-1	3400, 4300	2.154	0.207	10	0.072
Whi, 700	1-2, 4-5	13.738	0.104	38	0.006	Whi, 700	1-2, 4-5	13.738	0.104	38	0.006	Cas, 1-2	3400, 4300	0.372	0.906	10	0.864
Whi, 700	2-3, 3-4	2.212	0.247	38	0.159	Whi, 700	2-3, 3-4	2.212	0.247	38	0.159	Cas, 2-3	3400, 4300	0.940	0.596	10	0.418
Whi, 700	2-3, 4-5	3.652	0.101	38	0.054	Whi, 700	2-3, 4-5	3.652	0.101	38	0.054	Cas, 3-4	3400, 4300	0.274	0.901	10	0.847
Whi, 700	3-4, 4-5	6.952	0.126	38	0.016	Whi, 700	3-4, 4-5	6.952	0.126	38	0.016	Cas, 4-5	3400, 4300	0.463	1.000	10	0.778
												Naz, 0-1	3400, 4300	2.015	0.034	84	0.042
												Naz, 1-2	3400, 4300	2.488	0.203	5	0.044
												Naz, 2-3	3400, 4300	0.243	1.000	5	0.923
												Naz, 3-4	3400, 4300	0.909	0.402	5	0.462
												Naz, 4-5	3400, 4300	0.963	0.394	5	0.435
												Set, 0-1	3400, 4300	2.429	0.109	10	0.048
												Set, 1-2	3400, 4300	2.193	0.093	10	0.067
												Set, 2-3	3400, 4300	0.670	0.699	10	0.671
												Set, 3-4	3400, 4300	2.487	0.093	10	0.040
												Set, 4-5	3400, 4300	2.864	0.109	10	0.032
												Slope, 0-1	3400, 4300	0.832	0.493	10	0.521
Within Ar x WD	Comparisons	t	P(perm)	perms	P(MC)	Cas, 3400	0-1, 1-2	3.445	0.091	38	0.062	Cas, 3400	0-1, 2-3	2.127	0.229	38	0.156
Cas, 3400	0-1, 3-4	1.550	0.296	38	0.257	Cas, 3400	0-1, 3-4	1.550	0.296	38	0.257	Cas, 3400	0-1, 4-5	1.916	0.158	38	0.140
Cas, 3400	1-2, 2-3	0.203	1.000	38	0.948	Cas, 3400	1-2, 2-3	0.203	1.000	38	0.948	Cas, 3400	1-2, 3-4	0.667	0.603	38	0.593
Cas, 3400	1-2, 3-4	0.667	0.603	38	0.593	Cas, 3400	1-2, 4-5	3.005	0.098	38	0.056	Cas, 3400	1-2, 4-5	3.005	0.098	38	0.056
Cas, 3400	2-3, 3-4	0.691	0.707	38	0.590	Cas, 3400	2-3, 3-4	0.691	0.707	38	0.590	Cas, 3400	2-3, 4-5	1.160	0.337	38	0.307
Cas, 3400	2-3, 4-5	1.160	0.337	38	0.307	Cas, 3400	3-4, 4-5	0.637	0.827	38	0.662	Cas, 3400	3-4, 4-5	0.637	0.827	38	0.662

Cas, 4300	0-1, 1-2	0.502	0.810	38	0.774
Cas, 4300	0-1, 2-3	0.806	0.574	38	0.547
Cas, 4300	0-1, 3-4	1.049	0.363	38	0.407
Cas, 4300	0-1, 4-5	0.492	0.802	38	0.775
Cas, 4300	1-2, 2-3	1.732	0.200	38	0.209
Cas, 4300	1-2, 3-4	0.487	0.875	38	0.674
Cas, 4300	1-2, 4-5	1.610	0.182	38	0.209
Cas, 4300	2-3, 3-4	0.507	0.636	38	0.687
Cas, 4300	2-3, 4-5	1.117	0.300	38	0.368
Cas, 4300	3-4, 4-5	0.717	0.619	38	0.609
Naz, 3400	0-1, 1-2	0.645	0.673	915	0.632
Naz, 3400	0-1, 2-3	0.928	0.437	891	0.433
Naz, 3400	0-1, 3-4	1.868	0.145	911	0.114
Naz, 3400	0-1, 4-5	3.052	0.035	926	0.035
Naz, 3400	1-2, 2-3	1.093	0.432	361	0.365
Naz, 3400	1-2, 3-4	2.963	0.074	366	0.057
Naz, 3400	1-2, 4-5	3.730	0.029	377	0.018
Naz, 3400	2-3, 3-4	1.173	0.362	374	0.318
Naz, 3400	2-3, 4-5	1.450	0.231	361	0.208
Naz, 3400	3-4, 4-5	0.684	0.615	370	0.587
Set, 3400	0-1, 1-2	0.631	0.620	38	0.600
Set, 3400	0-1, 2-3	1.494	0.179	38	0.230
Set, 3400	0-1, 3-4	3.815	0.092	38	0.043
Set, 3400	0-1, 4-5	3.733	0.106	38	0.052
Set, 3400	1-2, 2-3	0.527	0.666	38	0.669
Set, 3400	1-2, 3-4	3.232	0.096	38	0.058
Set, 3400	1-2, 4-5	3.476	0.150	38	0.070
Set, 3400	2-3, 3-4	2.146	0.193	38	0.144
Set, 3400	2-3, 4-5	2.294	0.154	38	0.136
Set, 3400	3-4, 4-5	1.328	0.316	38	0.283
Set, 4300	0-1, 1-2	1.561	0.239	38	0.225
Set, 4300	0-1, 2-3	0.646	0.609	38	0.687
Set, 4300	0-1, 3-4	0.756	0.555	38	0.560
Set, 4300	0-1, 4-5	0.904	0.488	38	0.516
Set, 4300	1-2, 2-3	2.080	0.192	38	0.143
Set, 4300	1-2, 3-4	2.579	0.177	38	0.110
Set, 4300	1-2, 4-5	1.361	0.363	38	0.262
Set, 4300	2-3, 3-4	0.739	0.597	38	0.607
Set, 4300	2-3, 4-5	1.199	0.275	38	0.346
Set, 4300	3-4, 4-5	1.228	0.402	38	0.352

13 **Table A3.** 4-factor PERMANOVA pairwise test results for significant double and three-way interactions based on functional data. Ar: area; WD:
 14 water depth; SD: sediment depth; perms: possible; permutations; P(MC): Monte-Carlo p-values. Bold P(MC) values: $p < 0.05$; bold, italic values:
 15 $p < 0.01$. Gol: Gollum channels; Whi: Whittard Cayon; Cas: Cascais Canyon; Set: Setúbal Canyon; Naz: Nazaré Canyon
 16

Irish Margin						Western Iberian Margin						Western Iberian Margin					
Double interactions						Double interactions						Three-way interactions					
Within Ar	Comparisons	t	P(perm)	perms	P(MC)	Within WD	Comparisons	t	P(perm)	perms	P(MC)	Within WD x SD	Comparisons	t	P(perm)	perms	P(MC)
Gol	0-1, 1-2	3.357	0.014	971	0.018	3400	Cas, Naz	1.561	0.128	678	0.126	3400, 0-1	Cas, Naz	1.002	0.443	84	0.397
Gol	0-1, 2-3	6.571	0.004	976	0.004	3400	Cas, Set	2.872	0.105	10	0.016	3400, 0-1	Cas, Set	0.520	0.788	10	0.637
Gol	0-1, 3-4	8.585	0.004	997	0.004	3400	Cas, Slope	0.665	0.742	20	0.639	3400, 0-1	Cas, Slope	1.080	0.505	10	0.341
Gol	0-1, 4-5	3.602	0.009	973	0.008	3400	Naz, Set	0.959	0.399	706	0.452	3400, 0-1	Naz, Set	0.841	0.521	84	0.440
Gol	1-2, 2-3	1.210	0.288	976	0.271	3400	Naz, Slope	0.935	0.434	690	0.420	3400, 0-1	Naz, Slope	2.433	0.018	84	0.029
Gol	1-2, 3-4	2.472	0.060	999	0.060	3400	Set, Slope	1.560	0.206	20	0.137	3400, 0-1	Set, Slope	2.386	0.107	10	0.039
Gol	1-2, 4-5	1.341	0.226	981	0.237	4300	Cas, Naz	2.628	0.001	20	0.010	3400, 1-2	Cas, Naz	1.030	0.447	35	0.326
Gol	2-3, 3-4	0.830	0.501	998	0.525	4300	Cas, Set	2.154	0.104	10	0.053	3400, 1-2	Cas, Set	2.079	0.226	10	0.106
Gol	2-3, 4-5	1.248	0.262	966	0.283	4300	Cas, Slope	2.835	0.036	20	0.006	3400, 1-2	Cas, Slope	0.944	0.761	4	0.466
Gol	3-4, 4-5	0.989	0.415	998	0.386	4300	Naz, Set	2.010	0.147	20	0.038	3400, 1-2	Naz, Set	2.414	0.029	35	0.062
Whi	0-1, 1-2	1.212	0.291	980	0.292	4300	Naz, Slope	2.286	0.113	10	0.057	3400, 1-2	Naz, Slope	0.773	0.405	5	0.537
Whi	0-1, 2-3	4.253	0.002	970	0.006	4300	Set, Slope	1.502	0.301	20	0.128	3400, 1-2	Set, Slope	2.247	0.243	4	0.128
Whi	0-1, 3-4	3.783	0.010	973	0.017	Within Ar						3400, 2-3	Cas, Naz	2.376	0.058	35	0.045
Whi	0-1, 4-5	3.267	0.015	981	0.007	Cas	3400, 4300	0.865	0.508	10	0.506	3400, 2-3	Cas, Set	1.710	0.208	10	0.150
Whi	1-2, 2-3	2.629	0.028	966	0.025	Cas	0-1, 1-2	2.287	0.072	979	0.077	3400, 2-3	Cas, Slope	2.567	0.245	4	0.093
Whi	1-2, 3-4	1.396	0.195	977	0.223	Cas	0-1, 2-3	1.982	0.094	976	0.091	3400, 2-3	Naz, Set	1.051	0.352	35	0.340
Whi	1-2, 4-5	2.413	0.067	988	0.076	Cas	0-1, 3-4	2.601	0.036	984	0.047	3400, 2-3	Naz, Slope	0.727	0.776	5	0.546
Whi	2-3, 3-4	1.274	0.253	974	0.269	Cas	0-1, 4-5	1.844	0.093	977	0.095	3400, 2-3	Set, Slope	0.122	1.000	4	0.961
Whi	2-3, 4-5	2.202	0.042	979	0.048	Cas	1-2, 2-3	1.851	0.110	969	0.091	3400, 3-4	Cas, Naz	2.129	0.023	35	0.049
Whi	3-4, 4-5	2.114	0.046	979	0.079	Cas	1-2, 3-4	0.850	0.534	983	0.500	3400, 3-4	Cas, Set	7.148	0.100	10	0.002
Within SD						Cas	1-2, 4-5	1.554	0.189	978	0.173	3400, 3-4	Cas, Slope	1.460	0.503	4	0.270
0-1	Gol, Whi	3.136	0.007	985	0.006	Cas	2-3, 3-4	0.909	0.450	972	0.440	3400, 3-4	Naz, Set	2.160	0.029	35	0.034
1-2	Gol, Whi	1.936	0.078	986	0.094	Cas	2-3, 4-5	2.630	0.044	980	0.041	3400, 3-4	Naz, Slope	1.058	0.399	5	0.383
2-3	Gol, Whi	3.735	0.003	984	0.006	Cas	3-4, 4-5	3.172	0.028	980	0.024	3400, 3-4	Set, Slope	4.259	0.236	4	0.042
3-4	Gol, Whi	6.938	0.001	991	0.001	Naz	3400, 4300	0.854	0.469	675	0.485	3400, 4-5	Cas, Naz	0.716	0.862	35	0.593
4-5	Gol, Whi	0.157	0.981	986	0.978	Naz	0-1, 1-2	1.613	0.216	998	0.214	3400, 4-5	Cas, Set	1.478	0.304	10	0.199
						Naz	0-1, 2-3	4.077	0.027	995	0.036	3400, 4-5	Cas, Slope	1.455	0.259	4	0.296
						Naz	0-1, 3-4	3.472	0.027	999	0.023	3400, 4-5	Naz, Set	1.708	0.116	35	0.116
						Naz	0-1, 4-5	5.035	0.012	998	0.006	3400, 4-5	Naz, Slope	1.142	0.402	5	0.333
						Naz	1-2, 2-3	1.644	0.144	983	0.144	3400, 4-5	Set, Slope	2.762	0.253	4	0.099
						Naz	1-2, 3-4	2.314	0.051	982	0.048	4300, 0-1	Cas, Naz	2.044	0.213	10	0.093
						Naz	1-2, 4-5	3.693	0.022	983	0.027	4300, 0-1	Cas, Set	1.655	0.192	10	0.142
						Naz	2-3, 3-4	1.377	0.235	985	0.225	4300, 0-1	Cas, Slope	1.368	0.191	10	0.239
						Naz	2-3, 4-5	2.351	0.027	975	0.046	4300, 0-1	Naz, Set	5.224	0.104	10	0.004
						Naz	3-4, 4-5	0.853	0.520	969	0.493	4300, 0-1	Naz, Slope	5.439	0.087	10	0.004
						Set	3400, 4300	3.719	0.113	10	0.006	4300, 0-1	Set, Slope	0.673	0.606	10	0.588
						Set	0-1, 1-2	1.323	0.249	975	0.248	4300, 1-2	Cas, Naz	1.552	0.477	4	0.233
						Set	0-1, 2-3	1.051	0.378	976	0.368	4300, 1-2	Cas, Set	1.991	0.186	10	0.088

Set	0-1, 3-4	5.598	0.006	982	0.001	4300, 1-2	Cas, Slope	0.463	1.000	4	0.786
Set	0-1, 4-5	2.975	0.036	978	0.035	4300, 1-2	Naz, Set	2.662	0.242	4	0.097
Set	1-2, 2-3	0.324	0.847	972	0.849	4300, 1-2	Set, Slope	1.410	0.498	4	0.328
Set	1-2, 3-4	3.448	0.011	974	0.014	4300, 2-3	Cas, Naz	1.292	0.510	4	0.301
Set	1-2, 4-5	4.927	0.004	969	0.004	4300, 2-3	Cas, Set	0.877	0.587	10	0.479
Set	2-3, 3-4	3.490	0.021	973	0.017	4300, 2-3	Cas, Slope	1.407	0.507	4	0.260
Set	2-3, 4-5	2.803	0.048	966	0.046	4300, 2-3	Naz, Set	1.369	0.482	4	0.282
Set	3-4, 4-5	0.637	0.674	975	0.637	4300, 2-3	Set, Slope	0.901	0.494	4	0.470
Slope	3400, 4300	2.729	0.001	10	0.043	4300, 3-4	Cas, Naz	3.095	0.257	4	0.039
Within SD	Comparisons	t	P(perm)	perms	P(MC)	4300, 3-4	Cas, Set	0.839	0.491	10	0.481
0-1	Cas, Naz	2.074	0.040	997	0.033	4300, 3-4	Cas, Slope	2.897	0.247	4	0.073
0-1	Cas, Set	1.641	0.122	985	0.119	4300, 3-4	Naz, Set	2.686	0.268	4	0.079
0-1	Cas, Slope	1.465	0.188	976	0.158	4300, 3-4	Set, Slope	2.411	0.255	4	0.113
0-1	Naz, Set	4.272	0.001	998	0.001	4300, 4-5	Cas, Naz	13.026	0.250	4	0.002
0-1	Naz, Slope	4.801	0.001	998	0.001	4300, 4-5	Cas, Set	1.334	0.408	10	0.246
0-1	Set, Slope	1.659	0.098	982	0.102	4300, 4-5	Cas, Slope	5.521	0.219	4	0.020
1-2	Cas, Naz	1.301	0.218	979	0.226	4300, 4-5	Naz, Set	1.956	0.247	4	0.155
1-2	Cas, Set	1.160	0.278	989	0.287	4300, 4-5	Set, Slope	0.431	1.000	4	0.803
1-2	Cas, Slope	0.579	0.647	172	0.722	Within Ar x SD	Comparisons	t	P(perm)	perms	P(MC)
1-2	Naz, Set	2.043	0.031	981	0.047	Cas, 0-1	3400, 4300	0.767	0.508	10	0.527
1-2	Naz, Slope	0.962	0.464	70	0.424	Cas, 1-2	3400, 4300	0.275	0.810	10	0.941
1-2	Set, Slope	0.770	0.586	170	0.541	Cas, 2-3	3400, 4300	0.549	0.784	10	0.737
2-3	Cas, Naz	2.348	0.026	980	0.040	Cas, 3-4	3400, 4300	0.189	1.000	10	0.952
2-3	Cas, Set	1.259	0.214	980	0.254	Cas, 4-5	3400, 4300	3.340	0.096	10	0.021
2-3	Cas, Slope	1.975	0.137	173	0.103	Naz, 0-1	3400, 4300	3.202	0.012	84	0.008
2-3	Naz, Set	1.621	0.110	973	0.139	Naz, 1-2	3400, 4300	1.330	0.403	5	0.254
2-3	Naz, Slope	0.892	0.462	70	0.458	Naz, 2-3	3400, 4300	0.241	1.000	5	0.896
2-3	Set, Slope	0.627	0.617	174	0.619	Naz, 3-4	3400, 4300	1.127	0.406	5	0.350
3-4	Cas, Naz	3.042	0.001	981	0.001	Naz, 4-5	3400, 4300	2.006	0.184	5	0.085
3-4	Cas, Set	4.383	0.001	986	0.001	Set, 0-1	3400, 4300	2.509	0.120	10	0.037
3-4	Cas, Slope	3.163	0.048	173	0.018	Set, 1-2	3400, 4300	3.500	0.108	10	0.018
3-4	Naz, Set	0.606	0.687	981	0.671	Set, 2-3	3400, 4300	1.016	0.401	10	0.397
3-4	Naz, Slope	0.859	0.520	70	0.489	Set, 3-4	3400, 4300	5.809	0.114	10	0.007
3-4	Set, Slope	1.277	0.240	175	0.256	Set, 4-5	3400, 4300	2.149	0.099	10	0.081
4-5	Cas, Naz	2.992	0.007	976	0.010	Slope, 0-1	3400, 4300	1.787	0.221	10	0.100
4-5	Cas, Set	1.893	0.074	987	0.061	Within Ar x WD	Comparisons	t	P(perm)	perms	P(MC)
4-5	Cas, Slope	0.401	0.707	173	0.775	Cas, 3400	0-1, 1-2	1.542	0.274	38	0.235
4-5	Naz, Set	1.104	0.359	979	0.347	Cas, 3400	0-1, 2-3	1.343	0.392	38	0.321
4-5	Naz, Slope	1.859	0.084	70	0.119	Cas, 3400	0-1, 3-4	1.408	0.323	38	0.287
4-5	Set, Slope	1.132	0.393	174	0.290	Cas, 3400	0-1, 4-5	2.544	0.119	38	0.061
						Cas, 3400	1-2, 2-3	1.636	0.243	38	0.239
						Cas, 3400	1-2, 3-4	0.514	0.888	38	0.743
						Cas, 3400	1-2, 4-5	2.458	0.177	38	0.123
						Cas, 3400	2-3, 3-4	1.324	0.321	38	0.308
						Cas, 3400	2-3, 4-5	3.742	0.110	38	0.056
						Cas, 3400	3-4, 4-5	5.358	0.104	38	0.028
						Cas, 4300	0-1, 1-2	2.014	0.111	38	0.133

Cas, 4300	0-1, 2-3	1.507	0.240	38	0.212
Cas, 4300	0-1, 3-4	3.149	0.104	38	0.068
Cas, 4300	0-1, 4-5	1.700	0.166	38	0.168
Cas, 4300	1-2, 2-3	0.967	0.469	38	0.475
Cas, 4300	1-2, 3-4	0.733	0.585	38	0.589
Cas, 4300	1-2, 4-5	1.352	0.300	38	0.278
Cas, 4300	2-3, 3-4	0.373	0.791	38	0.785
Cas, 4300	2-3, 4-5	0.692	0.702	38	0.552
Cas, 4300	3-4, 4-5	1.352	0.275	38	0.262
Naz, 3400	0-1, 1-2	2.378	0.093	892	0.089
Naz, 3400	0-1, 2-3	3.967	0.039	907	0.029
Naz, 3400	0-1, 3-4	2.800	0.034	923	0.034
Naz, 3400	0-1, 4-5	3.238	0.030	925	0.022
Naz, 3400	1-2, 2-3	0.513	0.764	364	0.754
Naz, 3400	1-2, 3-4	1.136	0.331	371	0.318
Naz, 3400	1-2, 4-5	1.277	0.275	371	0.299
Naz, 3400	2-3, 3-4	1.113	0.381	365	0.340
Naz, 3400	2-3, 4-5	0.996	0.507	375	0.440
Naz, 3400	3-4, 4-5	0.141	0.888	374	0.965
Set, 3400	0-1, 1-2	2.011	0.123	38	0.119
Set, 3400	0-1, 2-3	2.109	0.241	38	0.154
Set, 3400	0-1, 3-4	10.512	0.096	38	0.008
Set, 3400	0-1, 4-5	5.950	0.095	38	0.032
Set, 3400	1-2, 2-3	1.676	0.288	37	0.222
Set, 3400	1-2, 3-4	13.925	0.110	38	0.007
Set, 3400	1-2, 4-5	9.978	0.082	38	0.012
Set, 3400	2-3, 3-4	4.592	0.100	38	0.028
Set, 3400	2-3, 4-5	3.094	0.108	38	0.082
Set, 3400	3-4, 4-5	0.105	0.965	38	0.945
Set, 4300	0-1, 1-2	1.169	0.356	38	0.358
Set, 4300	0-1, 2-3	1.014	0.410	38	0.443
Set, 4300	0-1, 3-4	0.650	0.592	38	0.621
Set, 4300	0-1, 4-5	0.462	1.000	38	0.787
Set, 4300	1-2, 2-3	2.221	0.219	38	0.146
Set, 4300	1-2, 3-4	0.956	0.386	38	0.418
Set, 4300	1-2, 4-5	1.039	0.494	38	0.424
Set, 4300	2-3, 3-4	0.487	0.932	38	0.703
Set, 4300	2-3, 4-5	1.004	0.353	38	0.426
Set, 4300	3-4, 4-5	0.631	0.765	38	0.687

17

18

19 **Table A4.** 4-factor PERMANOVA pairwise test results for significant double and three-way interactions based on standing stock data. Ar: area;
 20 WD: water depth; SD: sediment depth; perms: possible; permutations; P(MC): Monte-Carlo p-values. Bold P(MC) values: $p < 0.05$; bold, italic
 21 values: $p < 0.01$. Gol: Gollum channels; Whi: Whittard Cayon; Cas: Cascais Canyon; Set: Setúbal Canyon; Naz: Nazaré Canyon.
 22

Irish Margin						Irish Margin					
Double interactions						Three-way interactions					
Within WD	Comparisons	t	P(perm)	perms	P(MC)	Within WD x SD	Comparisons	t	P(perm)	perms	P(MC)
1000	0-1, 1-2	7.287	0.083	488	0.021	1000, 0-1	Gol, Whi	1.385	0.315	3	0.276
1000	0-1, 2-3	8.924	0.084	504	0.006	1000, 1-2	Gol, Whi	3.783	0.338	3	0.052
1000	0-1, 3-4	7.544	0.080	491	0.013	1000, 2-3	Gol, Whi	2.297	0.320	3	0.088
1000	0-1, 4-5	4.365	0.067	162	0.129	1000, 3-4	Gol, Whi	2.356	0.352	3	0.094
1000	1-2, 2-3	6.327	0.063	487	0.022	1000, 4-5	Gol, Whi	0.429	1.000	3	0.793
1000	1-2, 3-4	5.905	0.061	501	0.018	700, 0-1	Gol, Whi	3.661	0.351	3	0.046
1000	1-2, 4-5	3.647	0.108	160	0.129	700, 1-2	Gol, Whi	1.162	0.686	3	0.372
1000	2-3, 3-4	2.054	0.156	494	0.174	700, 2-3	Gol, Whi	0.373	1.000	3	0.822
1000	2-3, 4-5	2.145	0.219	158	0.293	700, 3-4	Gol, Whi	1.601	0.319	3	0.246
1000	3-4, 4-5	4.603	0.101	160	0.131	700, 4-5	Gol, Whi	2.268	0.331	3	0.144
700	0-1, 1-2	1.102	0.385	504	0.371	Within Ar x SD	Comparisons	t	P(perm)	perms	P(MC)
700	0-1, 2-3	3.332	0.075	504	0.073	Gol, 0-1	1000, 700	0.369	1.000	3	0.777
700	0-1, 3-4	6.913	0.078	474	0.014	Gol, 1-2	1000, 700	1.740	0.344	3	0.216
700	0-1, 4-5	8.068	0.071	496	0.011	Gol, 2-3	1000, 700	0.352	1.000	3	0.852
700	1-2, 2-3	3.949	0.063	508	0.037	Gol, 3-4	1000, 700	6.143	0.309	3	0.013
700	1-2, 3-4	5.121	0.076	478	0.030	Gol, 4-5	1000, 700	0.840	1.000	3	0.486
700	1-2, 4-5	5.203	0.083	490	0.026	Whi, 0-1	1000, 700	7.034	0.331	3	0.018
700	2-3, 3-4	4.406	0.078	480	0.032	Whi, 1-2	1000, 700	1.344	0.358	3	0.280
700	2-3, 4-5	4.143	0.072	486	0.038	Whi, 2-3	1000, 700	1.148	0.652	3	0.352
700	3-4, 4-5	1.610	0.206	486	0.226	Whi, 3-4	1000, 700	0.871	1.000	3	0.530
700						Whi, 4-5	1000, 700	1.098	0.672	3	0.481
Within Ar	Comparisons	t	P(perm)	perms	P(MC)	Within Ar x WD	Comparisons	t	P(perm)	perms	P(MC)
Gol	0-1, 1-2	5.264	0.088	481	0.014	Gol, 1000	0-1, 1-2	7.972	0.273	3	0.054
Gol	0-1, 2-3	6.982	0.073	508	0.006	Gol, 1000	0-1, 2-3	4.285	0.239	3	0.093
Gol	0-1, 3-4	6.625	0.080	474	0.009	Gol, 1000	0-1, 3-4	3.667	0.285	3	0.131
Gol	0-1, 4-5	6.652	0.079	483	0.024	Gol, 1000	0-1, 4-5	3.759	0.238	3	0.133
Gol	1-2, 2-3	5.658	0.078	502	0.019	Gol, 1000	1-2, 2-3	4.953	0.279	3	0.093
Gol	1-2, 3-4	6.183	0.076	497	0.020	Gol, 1000	1-2, 3-4	4.528	0.238	3	0.118
Gol	1-2, 4-5	6.311	0.096	496	0.020	Gol, 1000	1-2, 4-5	4.649	0.261	3	0.117
Gol	2-3, 3-4	4.464	0.083	504	0.035	Gol, 1000	2-3, 3-4	1.605	0.246	3	0.340
Gol	2-3, 4-5	4.973	0.061	500	0.025	Gol, 1000	2-3, 4-5	2.340	0.258	3	0.218
Gol	3-4, 4-5	5.991	0.070	493	0.019	Gol, 1000	3-4, 4-5	5.835	0.221	3	0.120
Whi	0-1, 1-2	2.075	0.170	486	0.166	Gol, 700	0-1, 1-2	2.130	0.269	3	0.248
Whi	0-1, 2-3	4.626	0.077	469	0.036	Gol, 700	0-1, 2-3	6.831	0.226	3	0.075
Whi	0-1, 3-4	9.919	0.079	476	0.008	Gol, 700	0-1, 3-4	7.482	0.261	3	0.068
Whi	0-1, 4-5	7.551	0.048	162	0.073	Gol, 700	0-1, 4-5	7.906	0.250	3	0.055
Whi	1-2, 2-3	5.975	0.067	485	0.009	Gol, 700	1-2, 2-3	2.990	0.247	3	0.177
Whi	1-2, 3-4	5.241	0.069	505	0.025	Gol, 700	1-2, 3-4	4.337	0.268	3	0.160
Whi	1-2, 4-5	3.386	0.108	158	0.137	Gol, 700	1-2, 4-5	4.461	0.279	3	0.136
Whi	2-3, 3-4	2.163	0.152	493	0.156						

Within SD	Comparisons	t	P(perm)	perms	P(MC)
Whi	2-3, 4-5	1.757	0.238	161	0.311
Whi	3-4, 4-5	1.661	0.337	164	0.310
Whi, 1000	0-1, 1-2	7.127	0.235	3	0.060
Whi, 1000	0-1, 2-3	19.180	0.232	3	0.018
Whi, 1000	0-1, 3-4	66.430	0.251	3	0.008
Whi, 1000	1-2, 2-3	5.961	0.260	3	0.087
Whi, 1000	1-2, 3-4	7.227	0.269	3	0.058
Whi, 1000	2-3, 3-4	1.902	0.240	3	0.238
Whi, 700	0-1, 1-2	0.740	0.517	3	0.631
Whi, 700	0-1, 2-3	0.771	0.537	3	0.574
Whi, 700	0-1, 3-4	2.450	0.210	3	0.243
Whi, 700	0-1, 4-5	3.276	0.250	3	0.188
Whi, 700	1-2, 2-3	3.077	0.242	3	0.136
Whi, 700	1-2, 3-4	2.787	0.228	3	0.158
Whi, 700	1-2, 4-5	2.808	0.265	3	0.156
Whi, 700	2-3, 3-4	1.736	0.261	3	0.314
Whi, 700	2-3, 4-5	1.693	0.276	3	0.343
Whi, 700	3-4, 4-5	1.214	0.261	3	0.431
Gol, 700	2-3, 3-4	7.013	0.263	3	0.065
Gol, 700	2-3, 4-5	8.983	0.255	3	0.056
Gol, 700	3-4, 4-5	1.594	0.253	3	0.296
Gol, 700	0-1, 1-2	7.127	0.235	3	0.060
Gol, 700	0-1, 2-3	19.180	0.232	3	0.018
Gol, 700	0-1, 3-4	66.430	0.251	3	0.008
Gol, 700	1-2, 2-3	5.961	0.260	3	0.087
Gol, 700	1-2, 3-4	7.227	0.269	3	0.058
Gol, 700	2-3, 3-4	1.902	0.240	3	0.238
Gol, 700	0-1, 1-2	0.740	0.517	3	0.631
Gol, 700	0-1, 2-3	0.771	0.537	3	0.574
Gol, 700	0-1, 3-4	2.450	0.210	3	0.243
Gol, 700	0-1, 4-5	3.276	0.250	3	0.188
Gol, 700	1-2, 2-3	3.077	0.242	3	0.136
Gol, 700	1-2, 3-4	2.787	0.228	3	0.158
Gol, 700	1-2, 4-5	2.808	0.265	3	0.156
Gol, 700	2-3, 3-4	1.736	0.261	3	0.314
Gol, 700	2-3, 4-5	1.693	0.276	3	0.343
Gol, 700	3-4, 4-5	1.214	0.261	3	0.431

23

24

25

26