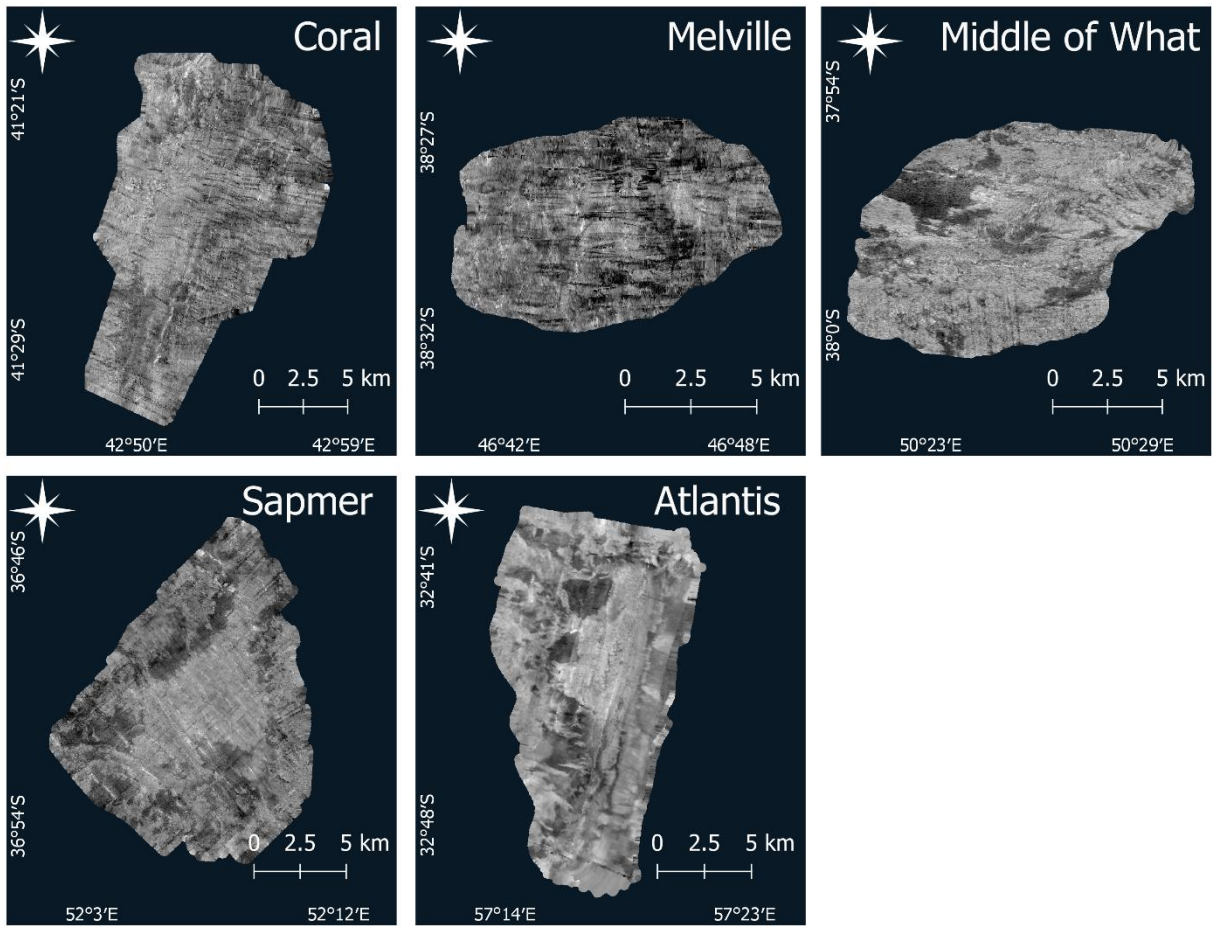


Supplementary material

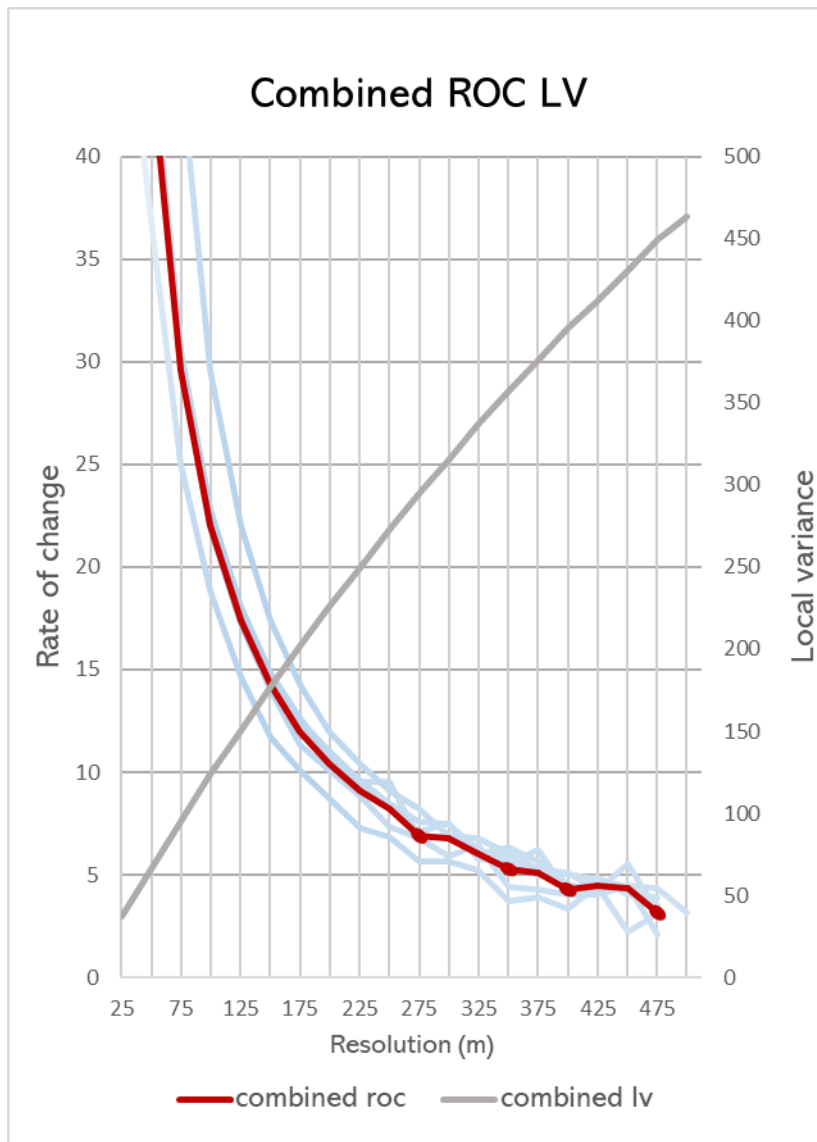
Article title: Mapping, quantifying and comparing seascape heterogeneity of Southwest Indian Ridge seamounts
Journal name: Landscape Ecology
Author names: Swanborn et al.
Affiliation and e-mail address: University of Oxford, denise.swanborn@env-res.ox.ac.uk

Supplementary Information 1: Backscatter



Supplementary Information 1: Backscatter images per site

Supplementary Information 2: ROC-LV curves for scale selection



Supplementary Information 2: ROC LV curves for scale selection. Light blue shows individual curves per site, red line shows combined curve with first break at 275m resolution.

Supplementary Information 3: Eigenvalues and principal component loadings

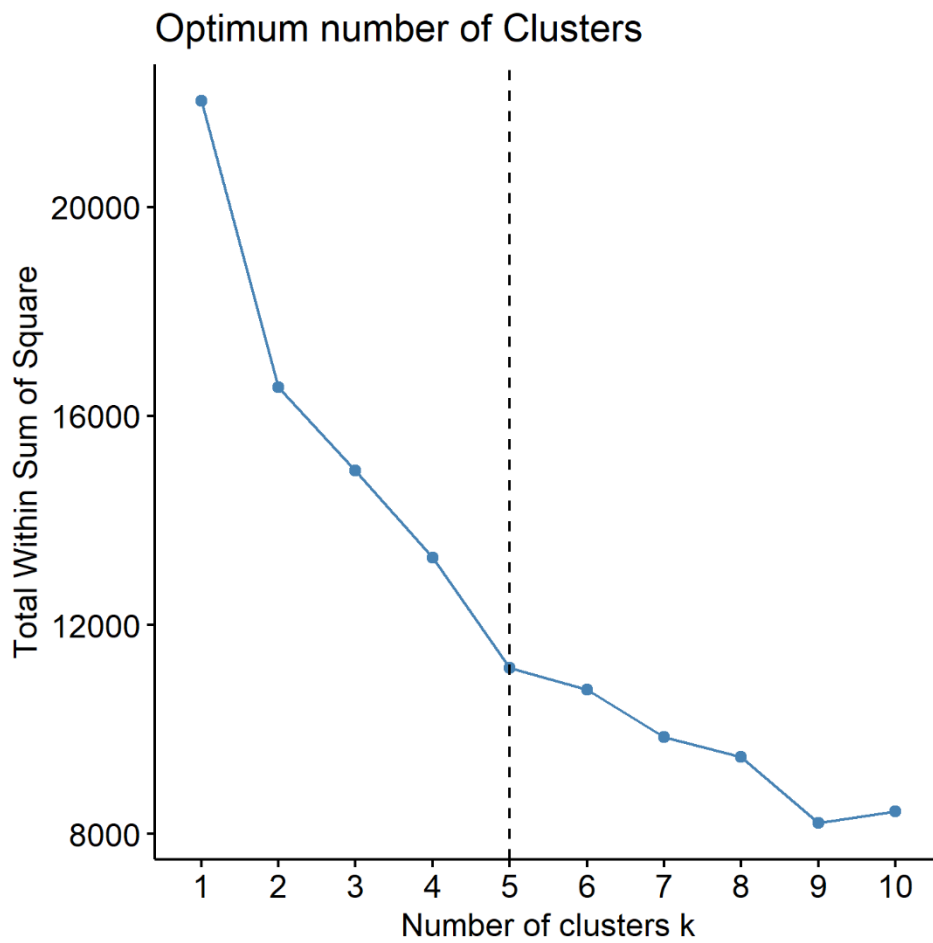
Supplementary Information 3-1: Loadings and proportion of variance explained by the 9 retained principal components

	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9
Standard deviation	2.019	1.5485	1.434	1.377	1.360	1.313	1.220	1.172	1.069
Proportion of Variance	0.203	0.120	0.103	0.095	0.092	0.086	0.074	0.069	0.057
Cumulative proportion	0.204	0.324	0.427	0.521	0.614	0.701	0.775	0.843	0.901

Supplementary Information 3-2: Variable contributions to 9 retained principal components, with key contributing variables (> 0.3 or < -0.3) in bold

Predictor	Comp.1	Comp.2	Comp.3	Comp.4	Comp.5	Comp.6	Comp.7	Comp.8	Comp. 9
depth	0.101	0.396	-0.208	-0.321	0.155	0.315	-0.113	0.106	0.101
depth_br	0.102	0.392	-0.209	-0.319	0.168	0.318	-0.114	0.107	0.102
bs	0.023	0.231	-0.284	-0.147	0.066	-0.485	0.279	-0.122	0.023
bs_br	0.034	0.254	-0.301	-0.141	0.079	-0.469	0.262	-0.101	0.034
curv	-0.006	0.089	-0.009	-0.217	-0.665	0.023	-0.007	0.011	-0.006
curv_br	-0.032	0.456	0.292	0.254	-0.024	0.026	-0.063	-0.353	-0.032
east	0.033	-0.038	0.435	-0.341	0.095	0.068	0.424	-0.022	0.033
east_br	0.038	-0.041	0.443	-0.350	0.097	0.056	0.401	-0.017	0.038
north	-0.134	-0.006	-0.259	0.243	-0.070	0.352	0.474	-0.093	-0.134
north_br	-0.151	0.001	-0.275	0.248	-0.069	0.350	0.446	-0.084	-0.151
slope	-0.434	0.005	-0.012	-0.146	0.060	0.002	-0.085	-0.067	-0.434
slope_br	-0.427	-0.006	-0.009	-0.162	0.076	0.082	-0.095	-0.022	-0.427
SOS	-0.268	-0.032	0.015	0.046	-0.043	-0.180	0.025	-0.041	-0.268
SOS_br	-0.135	0.207	0.098	0.171	-0.016	-0.094	0.129	0.641	-0.135
TPI	-0.008	0.097	-0.008	-0.215	-0.665	0.019	-0.006	0.010	-0.008
TPI_br	-0.032	0.455	0.292	0.254	-0.024	0.026	-0.063	-0.356	-0.032
TRI	-0.447	-0.004	-0.004	-0.120	0.041	-0.034	-0.071	-0.072	-0.447
TRI_br	-0.431	0.009	-0.003	-0.153	0.075	0.078	-0.089	-0.006	-0.431
VRM	-0.267	0.014	0.009	0.027	-0.067	-0.167	0.027	-0.012	-0.267
VRM_br	-0.122	0.302	0.182	0.234	-0.026	-0.079	0.085	0.511	-0.122

Supplementary Information 4: Elbowplot



Supplementary Information 4: Elbowplot showing a break in curve gradient at 5 clusters, selected as appropriate number of clusters for the unsupervised K-means classification

Supplementary Information 5: Class and Landscape metrics

Supplementary Information 5-1: Class metrics extracted per habitat class across seamounts. Highlighted values indicate important differences compared to other sites or habitat types

Type	Class metric	Habitat type	Coral	Melville	Middle of What	Sapmer	Atlantis
Composition	Percentage of landscape	1 (summit)	10.3448	10.5144	16.4424	14.613	18.791
		2 (slope)	14.97	26.78	5.41	14.51	21.73
		3 (SE)	26.12	20.73	25.66	14.11	23.51
		4 (NW)	9.42	15.34	23.84	19.43	34.54
		5 (ridges)	0.79	1.71	0.64	0.95	1.43
	Patch Area	1 (summit)	5.95	2.57	3.30	8.56	6.59
		2 (slope)	5.22	6.49	1.28	3.98	4.81
		3 (SE)	7.20	4.36	2.78	3.05	3.76
		4 (NW)	1.82	3.46	2.19	4.71	4.97
		5 (ridges)	1.26	1.49	1.01	1.02	1.34
	Gyration (Area-Weighted Mean)	1 (summit)	2244.79	764.02	1965.14	2244.92	2247.16
		2 (slope)	1914.62	1955.60	351.68	2193.26	2742.64
		3 (SE)	3128.18	2438.94	3340.14	1547.07	3373.16
		4 (NW)	775.30	764.47	2992.73	1864.62	2064.03
		5 (ridges)	331.49	532.67	246.03	265.62	295.47
Shape	Shape index	1 (summit)	1.18	1.21	1.22	1.27	1.23
		2 (slope)	1.24	1.27	1.28	1.27	1.26
		3 (SE)	1.19	1.24	1.23	1.28	1.21
		4 (NW)	1.22	1.28	1.21	1.28	1.21
		5 (ridges)	1.89	1.86	1.72	1.76	2.00
	Contiguity index	1 (summit)	0.11	0.15	0.13	0.15	0.15
		2 (slope)	0.22	0.22	0.24	0.22	0.22
		3 (SE)	0.12	0.15	0.11	0.12	0.12
		4 (NW)	0.12	0.15	0.11	0.12	0.12
		5 (ridges)	0.20	0.18	0.16	0.17	0.22
	Euclidean nearest neighbour (mean)	1 (summit)	78.05	73.63	72.24	75.58	79.81
		2 (slope)	87.53	71.92	89.31	87.66	82.20
		3 (SE)	74.26	71.13	66.61	76.43	79.44
		4 (NW)	78.98	82.24	69.43	77.55	71.46
		5 (ridges)	206.81	210.94	325.34	257.10	261.24
	ENN coefficient of variation	1 (summit)	0.22	0.29	0.25	0.27	0.27
		2 (slope)	0.26	0.33	0.27	0.27	0.28
		3 (SE)	0.23	0.29	0.25	0.25	0.23
		4 (NW)	0.24	0.26	0.23	0.23	0.26
		5 (ridges)	0.07	0.08	0.05	0.06	0.06
Subdivision	Number of patches	1 (summit)	511.00	419.00	842.00	456.00	449.00
		2 (slope)	449.00	422.00	716.00	974.00	711.00
		3 (SE)	1066.00	486.00	1557.00	1234.00	984.00
		4 (NW)	1522.00	453.00	1837.00	1101.00	1094.00
		5 (ridges)	185.00	118.00	107.00	248.00	168.00
	Splitting index	1 (summit)	105.39	340.86	47.62	56.77	34.91
		2 (slope)	141.53	37.01	10688.73	115.54	74.79
		3 (SE)	26.37	33.90	26.50	124.25	28.10
		4 (NW)	791.08	251.57	25.79	67.86	22.47
		5 (ridges)	662946.80	34655.45	790071.30	692364.30	281471.40

Dispersion and interspersions metrics	Clumpiness index	1 (summit)	0.93	0.84	0.88	0.92	0.93
		2 (slope)	0.88	0.86	0.72	0.86	0.85
		3 (SE)	0.91	0.86	0.79	0.82	0.86
		4 (NW)	0.80	0.83	0.75	0.86	0.84
		5 (ridges)	0.49	0.52	0.50	0.48	0.49
	Interspersion and juxtaposition index	1 (summit)	80.51	95.98	86.53	97.02	95.57
		2 (slope)	85.34	93.50	90.39	89.29	79.60
		3 (SE)	84.22	87.50	55.39	77.24	73.63
		4 (NW)	72.21	83.87	65.65	79.95	82.30
		5 (ridges)	87.65	86.41	92.92	90.53	93.94
	Normalised landscape shape index	1 (summit)	0.06	0.14	0.10	0.07	0.06
		2 (slope)	0.10	0.10	0.26	0.12	0.12
		3 (SE)	0.07	0.11	0.16	0.15	0.10
		4 (NW)	0.18	0.15	0.19	0.11	0.10
		5 (ridges)	0.51	0.47	0.49	0.51	0.50

Supplementary Information 5-2: Landscape-level comparison in terms of composition and configuration. Highlighted values indicate important differences compared to other sites

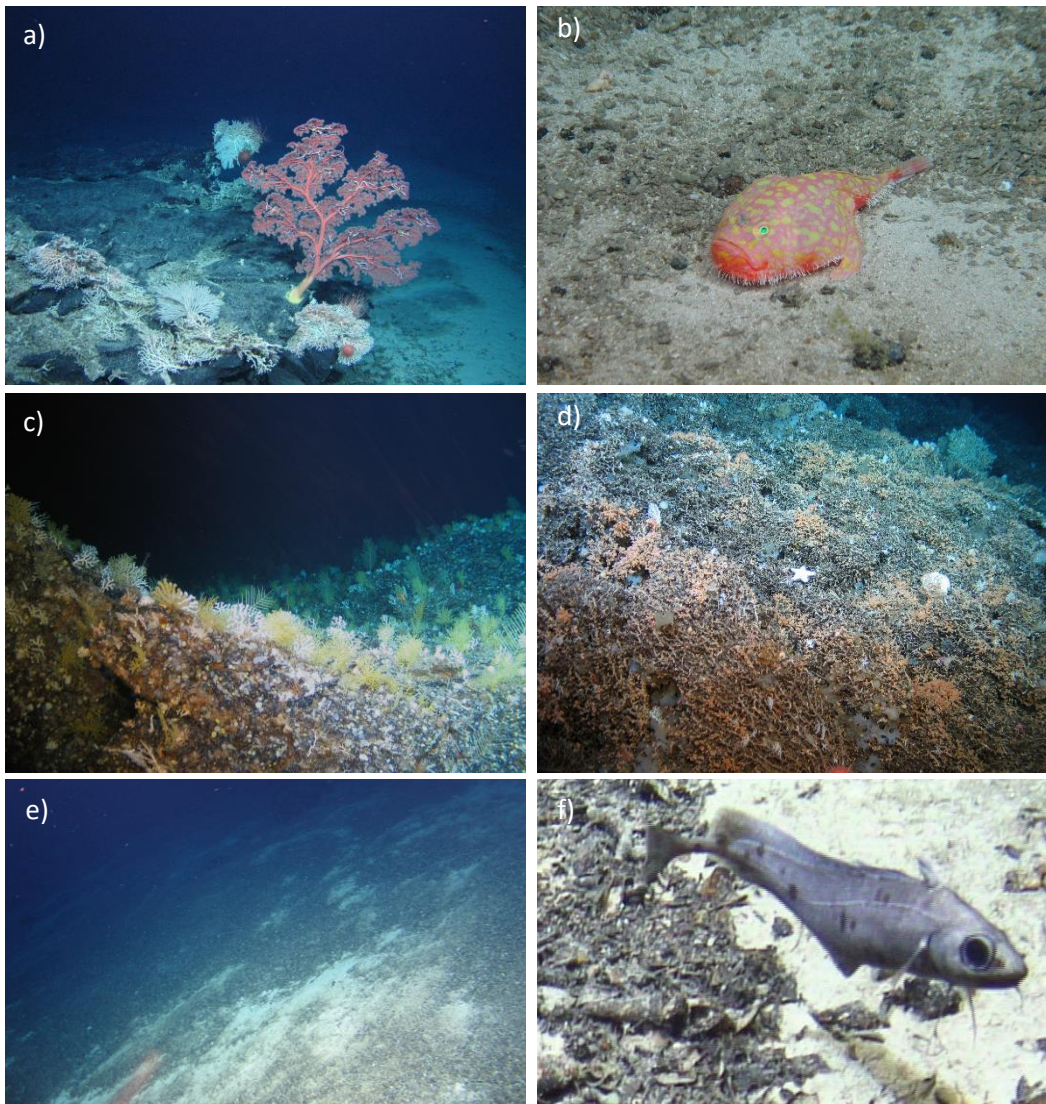
Metric		Spatial pattern metrics	Coral	Melville	Middle of What	Sapmer	Atlantis
Composition	Area metrics	Patch size	2657.18	864.4	1100.52	2059.58	1922.72
		Gyration	2289.98	1646.30	2659.12	1932.60	2528.47
	Diversity metrics	Shannon diversity	1.35	1.41	1.31	1.43	1.41
		Shannon evenness	0.84	0.88	0.81	0.89	0.88
Configuration	Shape metrics	Shape index	8.79	8.07	17.62	10.84	10.08
		Contiguity index	0.89	0.85	0.82	0.87	0.88
	Distribution metrics	Euclidean Nearest Neighbour (mean)	85.12	83.20	77.26	90.53	86.47
		CV ENN	121.32	101.88	97.5	117.91	116.62
	Subdivision metrics	Number of patches	4127	1898	5059	4013	3406
		Patch density (total nr of patches/total seamount area)	22.79	24.71	29.94	23.63	21.63
		Splitting index	17.94	15.76	10.25	20.38	8.19
	Aggregation and interspersions metrics	Contagion index	45.23	39.59	40.70	40.03	42.27
		Landscape shape index	27.58	23.76	32.13	32.61	27.58
		Interspersion and juxtaposition index	83.50	90.78	70.97	85.78	83.41

Supplementary Information 6: Pairwise-comparisons

Supplementary Information 6: Adjusted p-values for pair-wise comparisons in values of different class metrics per habitat class. Bold values indicate significant ($p < 0.05$) differences.

	Perc	PA	Gyr	Shape	Contig	ENN	ENN_CV	NP	SPLIT	CLUMP	IJI	LSI
<i>Ridge-NW</i>	0.00	0.25	0.07	0.00	0.00	0.00	0.00	0.00	0.54	0.00	0.06	0.00
<i>Ridge-SE</i>	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.92	0.00	0.04	0.00
<i>Ridge-Slope</i>	0.01	0.05	0.04	0.00	0.28	0.02	0.00	0.04	0.63	0.00	0.97	0.00
<i>Ridge-summit</i>	0.03	0.01	0.03	0.00	0.01	0.00	0.00	0.17	0.47	0.00	1.00	0.00
<i>Summit-Slope</i>	0.96	0.85	1.00	0.96	0.00	0.42	0.20	0.93	1.00	0.03	0.92	0.18
<i>Summit-NW</i>	0.48	0.35	0.99	0.64	0.42	1.00	0.58	0.00	1.00	0.00	0.04	0.10
<i>Summit-SE</i>	0.28	0.79	0.39	0.96	0.42	0.80	0.90	0.02	0.91	0.06	0.02	0.60
<i>Slope-SE</i>	0.64	1.00	0.32	1.00	0.00	0.07	0.04	0.11	0.97	0.99	0.12	0.90
<i>Slope-NW</i>	0.85	0.89	1.00	0.95	0.00	0.32	0.01	0.02	1.00	0.86	0.17	1.00
<i>SE-NW</i>	0.99	0.93	0.21	0.95	1.00	0.89	0.97	0.90	0.94	0.61	1.00	0.75s

Supplementary Information 7: Video Observations



Supplementary Information 7: Selected ROV observations from different potential habitats. a) attachment opportunities on flat-topped summit at Atlantis, b) *Chaunax stigmaeus* resting on a sandy patch on the summit of Sapmer, c) Summit ridge habitat at Melville covered in dense mesophotic coral gardens, d) steep slope at Coral covered in coral framework, e) SE flank at Melville featuring patches of soft sediment and f) cod species on deep northern flank at Coral