

Table S8. Results of distance-based permutational three-way PERMANOVA comparing spatio-temporal variation in the abundance of the main species of fish, intertidal invertebrates, subtidal invertebrates, intertidal algae, subtidal algae using 'zone' (two levels: lava deltas, control zone), and 'time' (three levels: 2 months, 4.5 months, 7 months), as fixed factors and 'sites' according to the Figure 1 as a random factor nested in 'zone × time' interaction. Z = zone, T = time, Si = site.

Most abundant taxa					
Fishes					
<i>Thalassoma pavo</i>					
Main test			A posteriori comparisions		
Fishes					
Source	df	MS	Pseudo-F	P(perm)	
Z	1	278.53	7.336	0.028	
T	2	5.606	0.1478	0.865	
ZxT	2	11.554	0.304	0.744	
Si(ZxT)	12	37.911	6.639	0.0001	
Res	143				
Total	160				
<i>Boops boops</i>					
Source	df	MS	Pseudo-F	P(perm)	
Z	1	300.08	0.120	0.758	
T	2	1851.2	0.735	0.532	
ZxT	2	421.09	0.167	0.876	
Si(ZxT)	12	2516.5	1.148	0.251	
Res	143				
Total	160				
<i>Canthigaster capistrata</i>					
Source	df	MS	Pseudo-F	P(perm)	Term 'ZxT' for pairs of levels of factor 'Zone'
Z	1	771.43	5.650	0.042	Within level '2 m' of factor 'Time': t = 1.533, p = 0.265
T	2	3099.5	22.713	0.001	Within level '4.5 m' of factor 'Time': t = 1.579, p = 0.186
ZxT	2	835.84	6.125	0.015	Within level '7 m' of factor 'Time': t = 2.976, p = 0.040
Si(ZxT)	12	136.35	1.724	0.077	Term 'ZxT' for pairs of levels of factor 'Time'
Res	143				Within level 'lava flows' of factor 'Zone'

Total 160

Groups	t	P(perm)
2 m,4.5 m	2.338	0.095
2m, 7 m	5.967	0.010
4.5m, 7m	5.710	0.005
Within level control zone' of factor 'Zone'		
Groups	t	P(perm)
2 m,4.5 m	0.366	0.747
2m, 7 m	1.305	0.273
4.5m, 7m	1.834	0.144

Sparisoma cretense

Source	df	MS	Pseudo-F	P(perm)	Term 'ZxT' for pairs of levels of factor 'Zone'
Z	1	121.02	2.870	0.117	Within level '2 m' of factor 'Time': t = 8.798, p = 0.011
T	2	236.63	5.614	0.024	Within level '4.5 m' of factor 'Time': t = 1.741, p = 0.163
ZxT	2	235.93	5.597	0.023	Within level '7 m' of factor 'Time': t = 2.157, p = 0.102
Si(ZxT)	12	42.115	1.504	0.135	Term 'ZxT' for pairs of levels of factor 'Time'
Res	143				Within level 'lava flows' of factor 'Zone'
Total	160				Groups t P(perm)
					2 m,4.5 m 1.090 0.369
					2m, 7 m 8.125 0.004
					4.5m, 7m 10.458 0.002
					Within level control zone' of factor 'Zone'
					Groups t P(perm)
					2 m,4.5 m 0.291 0.781
					2m, 7 m 0.325 0.781
					4.5m, 7m 0.124 0.907

Similiparma lurida

Source	df	MS	Pseudo-F	P(perm)
Z	1	1287	34.334	0.0003
T	2	15.357	0.410	0.671
ZxT	2	15.626	0.417	0.686
Si(ZxT)	12	37.429	2.702	0.003
Res	143			
Total				

Chromis limbata

Source	df	MS	Pseudo-F	P(perm)
Z	1	5.984E-2	1.505E-3	0.968
T	2	46.088	0.430	0.662
ZxT	2	11.363	0.106	0.895
Si(ZxT)	12	107.18	1.545	0.122
Res	143			
Total	160			

Intertidal macroinvertebrates***Phorcus sauciatu***

Source	df	MS	Pseudo-F	P(perm)
Z	1	157	5.668	0.038
T	2	2.599	9.386E-2	0.909
ZxT	2	14.844	0.536	0.594
Si(ZxT)	12	27.695	3.203	0.001
Res	143			
Total	160			

Patella ordinaria

Source	df	MS	Pseudo-F	P(perm)
Z	1	1153.8	0.934	0.3781
T	2	1066.4	0.863	0.4674
ZxT	2	22.054	1.785E-2	0.9866
Si(ZxT)	12	1235.2	2.952	0.001
Res	143			
Total	160			

Patella aspera

Source	df	MS	Pseudo-F	P(perm)
Z	1	1963.4	4.1789	0.0699
T	2	217.17	0.46222	0.6469
ZxT	2	95.833	0.20397	0.8228

Si(ZxT)	12	469.83	3.3489	0.0008
Res	143			
Total	160			

Subtidal macroinvertebrates

Percnon gibbesi

Source	df	MS	Pseudo-F	P(perm)
Z	1	4532	24.118	0.001
T	2	185	0.984	0.407
ZxT	2	206.95	1.101	0.376
Si(ZxT)	12	187.91	2.694	0.004
Res	143			
Total	160			

Hermodice carunculata

Source	df	MS	Pseudo-F	P(perm)
Z	1	590.24	19.442	0.002
T	2	58.282	1.9198	0.197
ZxT	2	30.407	1.0016	0.405
Si(ZxT)	12	30.359	5.3039	0.0001
Res	143			
Total	160			

Antedon bifida

Source	df	MS	Pseudo-F	P(perm)
Z	1	7.302	1.355	0.311
T	2	14.216	2.639	0.105
ZxT	2	8.694	1.614	0.243
Si(ZxT)	12	5.385	7.723	0.0001
Res	143			
Total	160			

Ascidia mentula

Source	df	MS	Pseudo-F	P(perm)
Z	1	0.396	1.235	0.292
T	2	0.118	0.367	0.698
ZxT	2	0.625	1.946	0.193
Si(ZxT)	12	0.321	1.721	0.068
Res	143			
Total	160			

Intertidal algae

<i>Ulva</i> spp.				
Source	df	MS	Pseudo-F	P(perm)
Z	1	50730	25.775	0.001
T	2	3193	1.6222	0.234
ZxT	2	18618	9.459	0.004
Si(ZxT)	12	13373	4.964	0.0001
Res	344	1970.1	2.001	0.025
Total	360			

Term 'ZxT' for pairs of levels of factor 'Zone'

Within level '2 m' of factor 'Time': t = 0.816, p = 0.477

Within level '4.5 m' of factor 'Time': t = 3.447, p = 0.025

Within level '7 m' of factor 'Time': t = 6.497, p = 0.001

Term 'ZxT' for pairs of levels of factor 'Time'

Within level 'lava flows' of factor 'Zone'

Groups	t	P(perm)
2 m, 4.5 m	2.463	0.012
2m, 7 m	8.125	0.065
4.5m, 7m	10.458	0.221

Within level control zone' of factor 'Zone'

Groups	t	P(perm)
2 m, 4.5 m	1.073	0.347
2m, 7 m	1.094	0.325
4.5m, 7m	0.689	0.890

<i>Corallina berteroi</i>				
Source	df	MS	Pseudo-F	P(perm)
Z	1	80635	24.831	0.001
T	2	6746.3	2.0773	0.171
ZxT	2	7343.3	2.2611	0.150
Si(ZxT)	12	3251.9	3.5457	0.0001
Res	344			
Total	360			

Ectocarpaleans/diatoms

Source	df	MS	Pseudo-F	P(perm)	Term 'ZxT' for pairs of levels of factor 'Zone'
Z	1	1378.7	34.165	0.0005	Within level '2 m' of factor 'Time': t = 13.302, p = 0.0007
T	2	128.58	3.185	0.077	Within level '4.5 m' of factor 'Time': t = 2.299, p = 0.082
ZxT	2	128.58	3.185	0.082	Within level '7 m' of factor 'Time': t = 1.856, p = 0.140
Si(ZxT)	12	40.422	5.943	0.0001	Term 'ZxT' for pairs of levels of factor 'Time'
Res	344				Within level 'lava flows' of factor 'Zone'
Total	360				Groups t P(perm)
					2 m,4.5 m 3.215 0.052
					2m, 7 m 0.993 0.400
					4.5m, 7m 0.772 0.505
					Within level control zone' of factor 'Zone'
					Groups t P(perm)
					2 m,4.5 m no test
					2m, 7 m no test
					4.5m, 7m no test

Bangia atropurpurea

Source	df	MS	Pseudo-F	P(perm)	Term 'ZxT' for pairs of levels of factor 'Zone'
Z	1	38422	20.759	0.001	Within level '2 m' of factor 'Time': t = 2.201, p = 0.108
T	2	9378.9	5.066	0.015	Within level '4.5 m' of factor 'Time': t = 3.841, p = 0.020
ZxT	2	10818	5.844	0.007	Within level '7 m' of factor 'Time': t = 3.175, p = 0.034
Si(ZxT)	12	1853.4	3.263	0.0002	Term 'ZxT' for pairs of levels of factor 'Time'
Res	344				Within level 'lava flows' of factor 'Zone'
Total	360				Groups t P(perm)
					2 m,4.5 m 1.859 0.160
					2m, 7 m 0.331 0.770
					4.5m, 7m 1.964 0.127
					Within level control zone' of factor 'Zone'
					Groups t P(perm)
					2 m,4.5 m 0.996 0.377
					2m, 7 m 0.988 0.382
					4.5m, 7m no test

Crutose coralline algae

Source	df	MS	Pseudo-F	P(perm)
Z	1	5709.4	9.734	0.010

T	2	334.49	0.570	0.577
ZxT	2	101.9	0.173	0.838
Si(ZxT)	12	587.26	2.996	0.0007
Res	344			
Total	360			

Jania virgata

Source	df	MS	Pseudo-F	P(perm)
Z	1	16.076	2.365	0.170
T	2	1.681	0.247	0.780
ZxT	2	9.894E-2	1.455E-2	0.987
Si(ZxT)	12	6.808	17.261	0.0001
Res	344			
Total	360			

Subidal algae

Ectocarpaleans/diatoms

Source	df	MS	Pseudo-F	P(perm)
Z	1	1.5739E5	570.85	0.0001
T	2	14428	52.331	0.0001
ZxT	2	13236	48.007	0.0001
Si(ZxT)	12	275.71	1.121	0.3482
Res	525			
Total	542			

Term 'ZxT' for pairs of levels of factor 'Zone'

Within level '2 m' of factor 'Time': t = 28.072, p = 0.001

Within level '4.5 m' of factor 'Time': t = 13.946, p = 0.003

Within level '7 m' of factor 'Time': t = 6.753, p = 0.002

Term 'ZxT' for pairs of levels of factor 'Time'

Within level 'lava flows' of factor 'Zone'

Groups	t	P(perm)
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2 m,4.5 m	6.663	0.006
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2m, 7 m.	10.215	0.003
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4.5m, 7m	4.257	0.014
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Within level control zone' of factor 'Zone'

Groups	t	P(perm)
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2 m,4.5 m	1.460	0.245
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2m, 7 m	1.262	0.296
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4.5m, 7m	1.000	0.377
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Crustose coralline algae

Source	df	MS	Pseudo-F	P(perm)
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Term 'ZxT' for pairs of levels of factor 'Zone'

Z	1	2806.7	2.813	0.119	Within level '2 m' of factor 'Time': t = 2.176, p = 0.162
T	2	500.51	0.501	0.616	Within level '4.5 m' of factor 'Time': t = 1.397, p = 0.237
ZxT	2	7141.5	7.159	0.013	Within level '7 m' of factor 'Time': t = 3.048, p = 0.034
Si(ZxT)	12	997.51	6.439	0.0001	
Res	525				<u>Term 'ZxT' for pairs of levels of factor 'Time'</u>
Total	542				Within level 'lava flows' of factor 'Zone'
					Groups t P(perm)
					2 m,4.5 m 0.428 0.705
					2m, 7 m. 3.346 0.046
					4.5m, 7m 2.393 0.073
					Within level control zone' of factor 'Zone'
					Groups t P(perm)
					2 m,4.5 m 1.230 0.310
					2m, 7 m 2.311 0.107
					4.5m, 7m 1.547 0.191

Lophocladia trichoclados

Source	df	MS	Pseudo-F	P(perm)
Z	1	29038	12.275	0.005
T	2	1957.4	0.827	0.519
ZxT	2	1659.2	0.701	0.580
Si(ZxT)	12	2365.6	15.614	0.0001
Res	525			
Total	542			

Canistrocarpus cervicornis

Source	df	MS	Pseudo-F	P(perm)
Z	1	13402	27.002	0.0008
T	2	201.9	0.406	0.680
ZxT	2	200.17	0.403	0.689
Si(ZxT)	12	496.32	5.758	0.0001
Res	525			
Total	542			

Cottoniella filamentosa

Source	df	MS	Pseudo-F	P(perm)
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Z	1	2072.6	3.970	0.083
T	2	271.78	0.520	0.622
ZxT	2	590.08	1.130	0.3661
Si(ZxT)	12	522.03	5.370	0.0001
Res	525			
Total	542			

Taonia atomaria

Source	df	MS	Pseudo-F	P(perm)
Z	1	6832.6	6.697	0.021
T	2	2823.3	2.767	0.084
ZxT	2	2829.5	2.773	0.080
Si(ZxT)	12	1020.2	14.872	0.0001
Res	525			
Total	542			