

# Supplementary material

## 1.1 Benthic Fauna and Pelagic

Table 1 DISTL-M results for the benthic fauna and pelagic RA and PA data. Environmental factors included in the model are in the 'Environmental Factor' column, f-value is in the 'Pseudo-F' column and P-Value is in the 'P' column. Significant p-values are noted in the group column by a '\*' on the environmental factor. The 'prop' column shows the proportion of the variation in the data explained by that variable. The 'cumul.' column shows the cumulative portion of variation in the data sets that the value on the row and the rows above explain.

Data Set	Environmental factor	AIC	SS(trace)	Pseudo-F	P	Prop.	Cumul.
PA	<b>LTID</b>						
	Collection Method*	217.96	68886	6.9165	0.001	0.61119	0.61119
	Depth Level *	213.52	11404	3.5179	0.001	0.10118	0.71237
	Depth average*	211.19	4649.1	3.1809	0.001	0.041249	0.75362
	Latitude	210.69	2365.9	1.6764	0.053	0.020991	0.77461
	Longitude*	209.64	2626.4	1.9602	0.032	0.023302	0.79791
	<b>Family</b>						
	Collection Method*	214.49	64136	7.2895	0.001	0.62359	0.62359
	Depth Level*	209.11	11022	3.9805	0.001	0.10717	0.73076
	Depth average*	206.44	4253.7	3.4484	0.001	0.041359	0.77212
	Latitude*	205.46	2365.6	2.0208	0.022	0.023	0.79512
	Longitude*	203.66	2671.2	2.468	0.006	0.025972	0.8211
	<b>Order</b>						
	Collection Method*	201.02	56930	10.467	0.001	0.70404	0.70404
	Depth average	196.13	5221.7	5.8608	0.001	0.064575	0.76862
	Depth Level	193.65	3864.1	2.4726	0.004	0.047786	0.8164
	Latitude	193.44	1126	1.4773	0.171	0.013925	0.83033
	<b>Class</b>						
	Collection Method	187.22	36621	11.022	0.001	0.7147	0.7147
	Depth average	181.76	3417.2	6.4065	0.003	0.066691	0.78139
	Depth Level	179.9	2117	2.2138	0.05	0.041316	0.82271
RA	<b>LTID</b>						
	Collection Method	104.08	16930	6.4957	0.001	0.37128	0.37128
	Depth average	101.86	7951.5	3.8379	0.001	0.17437	0.54565
	Depth Level	101.22	6220.1	1.7161	0.148	0.1364	0.68205
	Longitude	100.38	2848.3	1.7114	0.165	0.062462	0.74451
	Latitude	98.095	3268.6	2.3399	0.097	0.071681	0.8162
	<b>Family</b>						
	Collection Method	104	14305	5.5249	0.001	0.33434	0.33434
	Depth average	101.72	7979.8	3.8924	0.001	0.18651	0.52085
	Depth Level	101.21	6015.6	1.6612	0.121	0.1406	0.66145

Longitude	100.36	2849.5	1.7143	0.17	0.0666	0.72805
Latitude	98.084	3261	2.3363	0.101	0.076218	0.80426
<b>Order</b>						
Collection Method	100.94	12891	6.2995	0.001	0.36414	0.36414
Depth average	100.41	3977.6	2.1464	0.058	0.11236	0.47651
Depth Level	99.068	6244.5	2.0328	0.068	0.1764	0.6529
Latitude	98.594	2129.2	1.4672	0.258	0.060146	0.71305
Longitude	97.07	2412	1.8683	0.189	0.068135	0.78118
<b>Class</b>						
Collection Method	100.16	10013	5.1967	0.001	0.32085	0.32085
Depth average	99.37	4088.6	2.39	0.049	0.13101	0.45186
Depth Level	97.952	5830.4	2.0681	0.091	0.18682	0.63867
Lon	97.814	1709.8	1.251	0.326	0.054784	0.69346
Latitude	96.102	2376.7	1.9832	0.147	0.076153	0.76961
<b>Phylum</b>						
Depth average	97.305	7096.4	4.5858	0.004	0.29423	0.29423
Depth Level	95.759	5912.1	2.3946	0.077	0.24513	0.53935
Lon	93.733	2958.5	2.9035	0.035	0.12267	0.66202
Latitude	92.519	1785.9	1.9638	0.151	0.074045	0.73606
Collection Method	88.75	2281.4	3.3514	0.045	0.094591	0.83066

Table 2 RELATE test for PA and RA benthic and pelagic fauna. Taxonomic level (LTID, Family, Order, Class and Phyla) indicated in the 'taxonomic level' column. Table also shows the sample statistic, significance and number of permutations.

Data set	Taxonomic level	Sample stat (RHO)	Significance %	Number of permutations
<b>PA</b>	LTID	0.395	0.1	999
	Family	0.494	0.1	999
	Order	0.43	0.1	999
	Class	0.277	0.1	999
	Phyla	1.66	1.6	999
<b>RA</b>	LTID	0.665	0.1	999
	Family	0.629	0.2	999
	Order	0.718	0.1	999
	Class	0.779	0.1	999
	Phyla	0.609	0.1	999

Table 3 PERMANOVA table for the RA and PA data for the benthic and pelagic fauna group. RA or PA indicated in the 'data set' column, Taxonomic level column indicates the taxonomic level the test was run at (LTID, family, order, class, phylum). F-value indicated in the 'Pseudo-F' column and p-value indicated in the 'P(Perm)' column. \* on a p-value indicates a significant result.

Data set	Taxonomic level	Source	df	SS	MS	Pseud o-F	P(per m)	Unique perms
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RA	LTID	Bioregion	1	16930	16930	6.4957	0.001*	761
	Family	Bioregion	1	14305	14305	5.5249	0.002*	756
	Order	Bioregion	1	12891	12891	6.2995	0.001*	779
	Class	Bioregion	1	10013	10013	5.1967	0.001*	765
	Phylum	Bioregion	1	6344.2	6344.2	3.9263	0.002*	747
PA	LTID	Bioregion	3	45860	15287	5.4882	0.001*	999
	Family	Bioregion	3	42481	14160	5.6296	0.001*	999
	Order	Bioregion	3	36762	12254	6.6687	0.001*	997
	Class	Bioregion	3	20456	6818.6	5.316	0.001*	999
	Phylum	Bioregion	3	6698.9	2233	4.5026	0.001*	999

Table 4 Relative abundance PERMANOVA mains test for the benthic and pelagic fauna group. Taxonomic level is indicated in bold and in an individual row in the 'bioregion' column. The bioregions that are being compared are indicated in the 'Bioregion' column. \*\* on the bioregion indicates a significant p-value and a \* indicates a close to significant p-value. P-values indicated in the 'P(perm)' column and t-value indicates in the 't' column. P(MC) is the Monte Carlo test which is used as the p-value when there are permutations are below 100.

Bioregion	t	P(perm)	Unique perms	P(MC)
<b>LTID</b>				
Caribbean/ Gulf of Mexico, Chile *	1.1634	0.088	13	0.225
Caribbean/ Gulf of Mexico, New Zealand **	2.1497	0.001	993	0.001
Caribbean/ Gulf of Mexico, Norwegian Sea **	2.8261	0.001	984	0.002
Chile, New Zealand *	1.4591	0.125	9	0.069
Chile, Norwegian Sea **	4.0476	0.122	8	0.001
New Zealand, Norwegian Sea **	3.6741	0.001	914	0.002
<b>Family</b>				
Caribbean/ Gulf of Mexico, Chile	1.1111	0.248	13	0.272
Caribbean/ Gulf of Mexico, New Zealand **	2.3444	0.001	997	0.001
Caribbean/ Gulf of Mexico, Norwegian Sea **	2.6315	0.001	986	0.001
Chile, New Zealand *	1.4085	0.104	9	0.087
Chile, Norwegian Sea **	3.9895	0.128	8	0.002
New Zealand, Norwegian Sea **	3.9946	0.001	931	0.001
<b>Order</b>				
Caribbean/ Gulf of Mexico, Chile	1.1864	0.206	13	0.248

Caribbean/ Gulf of Mexico, New Zealand **	2.7891	0.001	993	0.001
Caribbean/ Gulf of Mexico, Norwegian Sea **	2.7417	0.001	983	0.001
Chile, New Zealand *	1.528	0.106	9	0.069
Chile, Norwegian Sea **	3.377	0.131	8	0.001
New Zealand, Norwegian Sea **	4.3909	0.001	929	0.001
<b>Class</b>				
Caribbean/ Gulf of Mexico, Chile	1.0238	0.482	12	0.378
Caribbean/ Gulf of Mexico, New Zealand **	2.5691	0.001	993	0.001
Caribbean/ Gulf of Mexico, Norwegian Sea **	2.4358	0.001	978	0.001
Chile, New Zealand	1.3582	0.241	9	0.155
Chile, Norwegian Sea **	3.065	0.135	7	0.003
New Zealand, Norwegian Sea **	3.912	0.001	887	0.001
<b>Phyla</b>				
Caribbean/ Gulf of Mexico, Chile	0.8831	0.512	10	0.5
Caribbean/ Gulf of Mexico, New Zealand **	2.7676	0.001	982	0.005
Caribbean/ Gulf of Mexico, Norwegian Sea **	2.2112	0.007	962	0.013
Chile, New Zealand	1.3483	0.345	7	0.186
Chile, Norwegian Sea	1.227	0.377	6	0.268
New Zealand, Norwegian Sea **	2.856	0.002	720	0.001

Table 5 Presence/absence PERMANOVA mains test for the benthic and pelagic fauna group. Taxonomic level is indicated in bold and in an individual row in the 'bioregion' column. The bioregions that are being compared are indicated in the 'Bioregion' column. \*\* on the bioregion indicates a significant p-value and a \* indicates a close to significant p-value. P-values indicated in the 'P(perm)' column and t-value indicates in the 't' column. P(MC) is the Monte Carlo test which is used as the p-value when there are permutations are below 100.

Bioregion	t	P(perm)	Unique perms	P(MC)
<b>LTID</b>				
Caribbean/ Gulf of Mexico, Chile	1.1634	0.088	13	0.225
Caribbean/ Gulf of Mexico, New Zealand**	2.1497	0.001	993	0.001
Caribbean/ Gulf of Mexico, Norwegian sea**	2.8261	0.001	984	0.002
Chile, New Zealand*	1.4591	0.125	9	0.069
Chile, Norwegian sea**	4.0476	0.122	8	0.001
New Zealand, Norwegian sea**	3.6741	0.001	914	0.002
<b>Family</b>				
Caribbean/ Gulf of Mexico, Chile	1.1111	0.248	13	0.272
Caribbean/ Gulf of Mexico, New Zealand **	2.3444	0.001	997	0.001
Caribbean/ Gulf of Mexico, Norwegian sea **	2.6315	0.001	986	0.001
Chile, New Zealand*	1.4085	0.104	9	0.087
Chile, Norwegian sea**	3.9895	0.128	8	0.002
New Zealand, Norwegian sea **	3.9946	0.001	931	0.001
<b>Order</b>				
Caribbean/ Gulf of Mexico, Chile	1.1864	0.206	13	0.248
Caribbean/ Gulf of Mexico, New Zealand**	2.7891	0.001	993	0.001

Caribbean/ Gulf of Mexico, Norwegian sea**	2.7417	0.001	983	0.001
Chile, New Zealand*	1.528	0.106	9	0.069
Chile, Norwegian sea**	3.377	0.131	8	0.001
New Zealand, Norwegian sea**	4.3909	0.001	929	0.001
<b>Class</b>				
Caribbean/ Gulf of Mexico, Chile	1.0238	0.482	12	0.378
Caribbean/ Gulf of Mexico, New Zealand**	2.5691	0.001	993	0.001
Caribbean/ Gulf of Mexico, Norwegian sea**	2.4358	0.001	978	0.001
Chile, New Zealand	1.3582	0.241	9	0.155
Chile, Norwegian sea**	3.065	0.135	7	0.003
New Zealand, Norwegian sea**	3.912	0.001	887	0.001
<b>Phyla</b>				
Caribbean/ Gulf of Mexico, Chile	0.88311	0.512	10	0.5
Caribbean/ Gulf of Mexico, New Zealand**	2.7676	0.001	982	0.005
Caribbean/ Gulf of Mexico, Norwegian sea**	2.2112	0.007	962	0.013
Chile, New Zealand	1.3483	0.345	7	0.186
Chile, Norwegian sea	1.227	0.377	6	0.268
New Zealand, Norwegian sea**	2.856	0.002	720	0.001

Table 6 Table showing the average dissimilarity (%) between the bioregions at all taxonomic levels. Data set indicates the data set the information came from (PA/RA), bioregions indicates the 2 bioregions being compared.

Data set	Bioregions	Average Dissimilarity				
		LTID	Family	Order	Class	Phyla
PA	Caribbean/Gulf of Mexico & Chile	98.23	92.48	84.68	65.05	34.76
	Caribbean/Gulf of Mexico & New Zealand	97.84	95.73	86.51	67.87	38.08
	Chile & New Zealand	95.47	84.24	66.08	45.62	24.3
RA	Caribbean/Gulf of Mexico & Norwegian sea	95.5	88.76	80.71	63.73	36.66
	Chile & Norwegian sea	95.2	87.28	77.17	59.67	22.61
	New Zealand & Norwegian sea	95.04	91.58	77.31	55.75	27.84

Table 7 Table showing the average similarity (%) of methane seeps within the bioregions at all taxonomic levels. Data set indicates the data set the information came from (PA/RA).

Data set	Bioregion	Average similarity				
		LTID	Family	Order	Class	Phyla
PA	Caribbean/Gulf of Mexico	12.06	14.76	25.78	37.81	63.98
	New Zealand	25.77	32.95	50.46	62.92	82.97
	Chile	-	-	-	-	-
	Norwegian sea	70.74	72.91	72.24	77.41	81.53
RA	Caribbean/Gulf of Mexico	11.48	11.85	24.73	26.84	28.83
	Norwegian sea	49.37	49.4	51.56	53.41	65.19

Table 8 DISTLM of the PA benthic and pelagic fauna split by bioregion. Environmental factors included in the model are in the 'Environmental Factor' column, f-value is in the 'Pseudo-F' column

and P-Value is in the 'P' column. Significant p-values are noted in the group column by a '\*' on the environmental factor. The 'prop' column shows the proportion of the variation in the data explained by that variable. The 'cumul.' column shows the cumulative portion of variation in the data sets that the value on the row and the rows above explain.

Bioregion	Environmental factor	AIC	SS(trace)	Pseudo-F	P	Prop.	Cumul.
Caribbean/Gulf of Mexico	Collection Method*	95.908	23026	4.8127	0.001	0.51679	0.51679
	Depth Level*	90.855	11404	3.9419	0.001	0.25595	0.77274
	Depth average*	88.193	3259.8	2.8486	0.039	0.073161	0.8459
New Zealand	Depth average*	64.109	4852.7	1.9858	0.024	0.24866	0.24866
	Lat	63.842	3617.5	1.6376	0.088	0.18537	0.43403

## 1.2 Macrofauna

Table 9 DISTLM of the PA and RA Macrofauna data. Environmental factors included in the model are in the 'Environmental Factor' column, f-value is in the 'Pseudo-F' column and P-Value is in the 'P' column. Significant p-values are noted in the group column by a '\*' on the environmental factor. The 'prop' column shows the proportion of the variation in the data explained by that variable. The 'cumul.' column shows the cumulative portion of variation in the data sets that the value on the row and the rows above explain.

Data set	Environmental factor	AIC	SS(trace)	Pseudo-F	P	Prop.	Cumul.
PA	LTID						
	Longitude*	217.3	12746	4.3752	0.001	0.14894	0.14894
	Latitude*	214.91	10940	4.2425	0.001	0.12784	0.27679
	Depth average*	212.86	8611.5	3.7177	0.001	0.10063	0.37742
	Collection method*	211.81	12241	1.9888	0.002	0.14305	0.52047
	Depth level	211.43	6142.4	1.5843	0.079	0.071779	0.59225
	Family						
	Latitude*	209.32	9011	4.1563	0.001	0.14255	0.14255
	Depth level*	208.32	9172.7	2.3426	0.001	0.14511	0.28766
	Longitude*	207.35	4690.9	2.5584	0.007	0.074209	0.36187
	Depth average	207.16	3144.2	1.7752	0.086	0.04974	0.41161
	Order						
	Depth level*	203.53	10438	3.0838	0.001	0.20444	0.20444
	Latitude*	201.26	5952.8	3.9498	0.001	0.1166	0.32104
	Longitude*	199.36	4653.6	3.4114	0.003	0.091149	0.41219
	Collection method	198.83	6448.2	1.7332	0.064	0.1263	0.53849
	Depth average	198.18	2206.1	1.8594	0.092	0.043211	0.5817
	Class						
	Latitude*	197.47	7279.5	5.2078	0.001	0.1724	0.1724
	Longitude*	196.28	3899.8	3.0148	0.008	0.092358	0.26476
	Depth level*	194.9	5608.9	2.4256	0.009	0.13284	0.39759

	Collection method*	193.59	6032.8	1.9691	0.04	0.14287	0.54047
	Depth average	192.95	1806	1.8473	0.11	0.042771	0.58324
	Phyla						
	Latitude*	176.47	3604.8	5.614	0.001	0.18338	0.18338
	Collection method*	174.96	3900	2.3534	0.042	0.1984	0.38178
	Depth average	173.87	1311.6	2.5406	0.07	0.066721	0.4485
<b>RA</b>	LTID						
	Longitude*	186.76	14165	4.5787	0.001	0.17901	0.17901
	Latitude*	184.2	11690	4.3883	0.001	0.14773	0.32673
	Depth average*	182.7	7521.4	3.1233	0.001	0.095049	0.42178
	Collection method*	181.07	9928.5	2.3555	0.001	0.12547	0.54725
	Depth level	180.9	5944.6	1.492	0.094	0.075122	0.62237
	<b>FAM</b>						
	Latitude*	180.93	10584	4.4076	0.001	0.17348	0.17348
	Longitude*	179.46	7069.4	3.2611	0.002	0.11587	0.28935
	Collection method*	177.62	9721.7	2.6013	0.001	0.15935	0.4487
	Depth average*	176.91	3739.7	2.1266	0.017	0.061297	0.50999
	Depth level*	175.81	5939.7	1.8596	0.031	0.097358	0.60735
	<b>Order</b>						
	Latitude*	172.39	9668.3	5.8376	0.001	0.21751	0.21751
	Longitude*	170.02	6019.1	4.1855	0.001	0.13542	0.35293
	Collection method*	168.5	6139	2.4423	0.001	0.13811	0.49105
	Depth level*	166.5	5191.9	2.3829	0.006	0.11681	0.60785
	Depth average*	165.12	2386	2.3789	0.015	0.053679	0.66153
	<b>Class</b>						
	Latitude*	161.49	7645	7.4143	0.001	0.26094	0.26094
	Longitude*	159.78	3222.2	3.4965	0.003	0.10998	0.37092
	Collection method*	158.12	4025.5	2.515	0.009	0.1374	0.50831
	Depth level*	156.65	3048	2.1469	0.021	0.10403	0.61235
	Depth average	156.51	1009.1	1.4627	0.187	0.034443	0.64679
	<b>Phyla</b>						
	Longitude*	143.67	2715.7	5.7147	0.003	0.21392	0.21392
	Latitude*	141.98	1481.7	3.4871	0.034	0.11671	0.33062

Table 10 RELATE test for PA and RA macrofauna data. Taxonomic level (LTID, Family, Order, Class and Phyla) indicated in the 'taxonomic level' column. Table also shows the sample statistic, significance and number of permutations.

	Taxonomic level	Sample stat (RHO)	Significance	Number of permutations
<b>PA</b>	LTID	0.337	0.1	999
	Family	0.448	0.1	999
	Order	0.361	0.4	999
	Class	0.337	0.1	999
	Phyla	0.082	16.6	999
<b>RA</b>	LTID	0.359	0.2	999

Family	0.307	0.2	999
Order	0.275	0.6	999
Class	0.283	0.7	999
Phyla	0.265	0.3	999

Table 11 PERMANOVA table for the RA and PA data for macrofauna group. RA or PA indicated in the 'data set' column, Taxonomic level column indicates the taxonomic level the test was run at (LTID, family, order, class, phylum). F-value indicated in the 'Pseudo-F' column and p-value indicated in the 'P(Perm)' column. \* on a p-value indicates a significant result.

Data set	Taxonomic level	Source	df	SS	MS	Pseudo-F	P(perm)	unique perms
RA	LTID	Bioregion	3	32126	10709	4.3285	0.001*	999
RA	Family	Bioregion	3	21323	7107.6	3.4028	0.001*	997
RA	Order	Bioregion	3	17818	5939.3	4.2374	0.001*	999
RA	Class	Bioregion	3	11865	3955	4.3105	0.001*	999
RA	Phylum	Bioregion	3	4636.6	1545.5	3.6438	0.001*	999
PA	LTID	Bioregion	3	34742	11581	5.2399	0.001*	999
PA	Family	Bioregion	3	25475	8491.6	5.1754	0.001*	998
PA	Order	Bioregion	3	19706	6568.8	4.8195	0.001*	999
PA	Class	Bioregion	3	16628	5542.6	4.9803	0.001*	999
PA	Phylum	Bioregion	3	6706.6	2235.5	3.9702	0.002*	999

Table 12 Relative abundance PERMANOVA mains test for the macrofauna group. Taxonomic level is indicated in bold and in an individual row in the 'bioregion' column. The bioregions that are being compared are indicated in the 'Bioregion' column. \*\* on the bioregion indicates a significant p-value and a \* indicates a close to significant p-value. P-values indicated in the 'P(perm)' column and t-value indicates in the 't' column. P(MC) is the Monte Carlo test which is used as the p-value when there are permutations are below 100.

Groups	t	P(perm)	unique perms	P(MC)
<b>LTID</b>				
North Pacific, Caribbean/Gulf of Mexico	1.3955	0.155	7	0.13
North Pacific, Gulf of California **	1.9906	0.001	897	0.004
North Pacific, New Zealand **	2.6747	0.001	748	0.001
Caribbean/ Gulf of Mexico, Gulf of California	1.3162	0.103	10	0.15
Caribbean/Gulf of Mexico, New Zealand **	2.4792	0.136	8	0.006
Gulf of California, New Zealand **	2.4494	0.001	971	0.001
<b>Family</b>				
North Pacific, Caribbean/Gulf of Mexico	1.5284	0.147	7	0.1
North Pacific, Gulf of California **	1.7578	0.008	902	0.01
North Pacific, New Zealand **	2.0985	0.001	754	0.004
Caribbean/ Gulf of Mexico, Gulf of California	0.9436	0.684	10	0.5
Caribbean/Gulf of Mexico, New Zealand **	2.0783	0.126	8	0.017
Gulf of California, New Zealand **	2.3541	0.001	959	0.003
<b>Order</b>				
North Pacific, Caribbean/Gulf of Mexico	1.4861	0.153	7	0.105



North Pacific, Gulf of California **	2.0681	0.002	906	0.002
North Pacific, New Zealand **	2.412	0.001	748	0.001
Caribbean/ Gulf of Mexico, Gulf of California	0.7598	0.904	10	0.693
Caribbean/Gulf of Mexico, New Zealand **	2.3912	0.138	8	0.008
Gulf of California, New Zealand **	2.6609	0.001	955	0.002
<b>Class</b>				
North Pacific, Caribbean/Gulf of Mexico	1.476	0.139	7	0.12
North Pacific, Gulf of California **	2.0031	0.001	888	0.005
North Pacific, New Zealand **	2.3317	0.001	740	0.004
Caribbean/ Gulf of Mexico, Gulf of California	0.8633	0.899	10	0.565
Caribbean/Gulf of Mexico, New Zealand **	2.6186	0.125	8	0.002
Gulf of California, New Zealand **	2.8194	0.001	943	0.001
<b>Phylum</b>				
North Pacific, Caribbean/Gulf of Mexico *	1.7953	0.151	7	0.07
North Pacific, Gulf of California	1.484	0.115	905	0.118
North Pacific, New Zealand**	3.1525	0.002	765	0.001
Caribbean/ Gulf of Mexico, Gulf of California	0.643	0.797	10	0.656
Caribbean/Gulf of Mexico, New Zealand **	2.2602	0.131	8	0.012
Gulf of California, New Zealand **	2.522	0.001	955	0.003

Table 13 Presence/absence PERMANOVA mains test for the macrofauna group. Taxonomic level is indicated in bold and in an individual row in the 'bioregion' column. The bioregions that are being compared are indicated in the 'Bioregion' column. \*\* on the bioregion indicates a significant p-value and a \* indicates a close to significant p-value. P-values indicated in the 'P(perm)' column and t-value indicates in the 't' column. P(MC) is the Monte Carlo test which is used as the p-value when there are permutations are below 100.

<b>Bioregions</b>	<b>t</b>	<b>P(perm)</b>	<b>Unique perms</b>
<b>LTID</b>			
North Pacific, Caribbean/ Gulf of Mexico **	1.928	0.007	313
North Pacific, Gulf of California **	1.9609	0.001	954
North Pacific, New Zealand **	2.7092	0.001	765
Caribbean/ Gulf of Mexico, Gulf of California **	2.037	0.001	547
Caribbean/Gulf of Mexico, New Zealand **	3.203	0.004	312
Gulf of California, 28-New Zealand **	2.4994	0.001	950
<b>Family</b>			
North Pacific, Caribbean/ Gulf of Mexico **	2.6214	0.003	312
North Pacific, Gulf of California **	1.9214	0.003	945
North Pacific, New Zealand **	2.2108	0.001	739
Caribbean/ Gulf of Mexico, Gulf of California **	2.0744	0.001	532
Caribbean/Gulf of Mexico, New Zealand **	3.0721	0.008	311
Gulf of California, 28-New Zealand **	2.2853	0.001	968
<b>Order</b>			
North Pacific, Caribbean/ Gulf of Mexico **	2.204	0.003	314
North Pacific, Gulf of California **	1.9217	0.001	950
North Pacific, New Zealand **	2.4873	0.001	773

Caribbean/ Gulf of Mexico, Gulf of California **	1.9145	0.003	540
Caribbean/Gulf of Mexico, New Zealand **	3.1761	0.004	319
Gulf of California, 28-New Zealand **	2.1744	0.001	966

#### Class

North Pacific, Caribbean/ Gulf of Mexico **	2.3759	0.005	310
North Pacific, Gulf of California **	2.1771	0.001	949
North Pacific, New Zealand **	2.4248	0.001	777
Caribbean/ Gulf of Mexico, Gulf of California **	1.8938	0.002	527
Caribbean/Gulf of Mexico, New Zealand **	2.7171	0.002	316
Gulf of California, 28-New Zealand **	2.2325	0.002	957

#### Phyla

North Pacific, Caribbean/ Gulf of Mexico **	2.9965	0.004	235
North Pacific, Gulf of California **	2.3921	0.007	896
North Pacific, New Zealand **	1.8594	0.028	706
Caribbean/ Gulf of Mexico, Gulf of California	1.2728	0.206	288
Caribbean/Gulf of Mexico, New Zealand **	2.5833	0.006	312
Gulf of California, 28-New Zealand *	1.6104	0.085	936

Table 14 Table showing the average dissimilarity (%) between the bioregions at all taxonomic levels. Data set indicates the data set the information came from (PA/RA), bioregions indicates the 2 bioregions being compared.

Data Set	Bioregion	Average Dissimilarity				
		LTID	Family	Order	Class	Phyla
Pa	North Pacific & Caribbean /Gulf of Mexico	85.89	78.67	67.92	56.88	36.24
	North Pacific & Gulf of California	87.43	70.13	65.07	59.05	43.14
	Caribbean /Gulf of Mexico & Gulf of California	92.65	86.91	76.11	67.34	36.71
	North Pacific & New Zealand	77.85	52.08	49.45	45.39	27.59
	Caribbean /Gulf of Mexico & New Zealand	83.89	78.66	71.13	62	37.14
	Gulf of California & 28-New Zealand	80.24	71.09	61.19	60.56	38.48
RA	North Pacific & Caribbean /Gulf of Mexico	92.58	80.02	65.38	51.15	30.67
	North Pacific & Gulf of California	92.54	78.74	69.39	56.3	32.94
	Caribbean /Gulf of Mexico & Gulf of California	95.8	73.56	54.53	48.09	28.96
	North Pacific & New Zealand	86.13	66.58	57.22	42.37	28.96
	Caribbean /Gulf of Mexico & New Zealand	96.33	82.18	71.2	53.29	28.29
	Gulf of California & New Zealand	86.44	81.39	69.69	58.2	31.84

Table 15 Table showing the average similarity (%) of methane seeps within the bioregions at all taxonomic levels. Data set indicates the data set the information came from (PA/RA).

Data set	Bioregion	Average similarity				
		LTID	Family	Order	Class	Phyla
PA	North Pacific	30.47	54.16	55.92	66.35	79.46
	Caribbean/Gulf of Mexico	36.95	40.74	43.96	54.33	75.91
	Gulf of California	23.11	29.34	36.34	42.53	58.38
	New Zealand	65.16	65.65	73.72	66.91	75.03
RA	North Pacific	27.92	42.01	51.54	62.25	80.87

Gulf of California	20.3	24.49	37.74	48.08	63.92
New Zealand	53.26	53.45	64.46	75.05	83.32

Table 16 DISTLM of the PA macrofauna split by bioregion. Environmental factors included in the model are in the 'Environmental Factor' column, f-value is in the 'Pseudo-F' column and P-Value is in the 'P' column. Significant p-values are noted in the group column by a '\*' on the environmental factor. The 'prop' column shows the proportion of the variation in the data explained by that variable. The 'cumul.' column shows the cumulative portion of variation in the data sets that the value on the row and the rows above explain.

Bioregion	Group	AIC	SS(trace)	Pseudo-F	P	Prop.	Cumul.
North Pacific	Depth average*	53.917	6816.3	3.8944	0.005	0.43785	0.43785
	Latitude	52.285	3542.8	2.7208	0.147	0.22757	0.66543
	Collection Method	50.289	2997	1.3551	0.377	0.19251	0.85794
	Depth Level	48.7	887.11	0.66978	0.598	0.056984	0.91492
Caribbean/ Gulf of Mexico	Latitude	31.051	3191.3	1.8448	0.176	0.47982	0.47982
	Longitude	28.627	2314.9	2.0221	0.308	0.34806	0.82788
Gulf of California	Depth average	74.065	2821.3	0.91274	0.548	0.11535	0.11535
	Depth average	73.168	2821.3	0.91274	0.523	0.11535	0
New Zealand	No factors in the model						

## 1.3 Meiofauna

Table 17 DISTLM of PA and RA Meiofauna data. Environmental factors included in the model are in the 'Environmental Factor' column, f-value is in the 'Pseudo-F' column and P-Value is in the 'P' column. Significant p-values are noted in the group column by a '\*' on the environmental factor. The 'prop' column shows the proportion of the variation in the data explained by that variable. The 'cumul.' column shows the cumulative portion of variation in the data sets that the value on the row and the rows above explain.

	Environmental factor	AIC	SS(trace)	Pseudo-F	P	Prop.	Cumul.
PA	<b>LTID</b>						
	Depth level*	71.036	16746	8.7805	0.005	0.71499	0.71499
	Collection method*	66.499	3203.1	5.535	0.003	0.13676	0.85175
	Longitude	65.977	774.12	1.4346	0.266	0.033052	0.88481
	<b>Fam</b>						
	Depth level*	71.27	15210	7.7903	0.005	0.69	0.69
	Collection method*	66.945	3203.1	5.2939	0.007	0.14531	0.83531
	Longitude	66.547	774.12	1.3552	0.297	0.035118	0.87043
	Depth level	66.14	1235.1	1.081	0.424	0.056029	0.8144
	<b>Order</b>						

	Depth level*	70.36	14346	8.0474	0.005	0.6969	0.6969
	Collection method*	65.491	3100.1	5.9253	0.003	0.1506	0.8475
	Longitude	64.66	774.03	1.6363	0.251	0.037602	0.8851
	Depth level	64.481	1100.5	1.1633	0.389	0.053463	0.83164
	<b>Class</b>						
	Depth level*	67.391	13304	10.043	0.008	0.74157	0.74157
	Collection method*	64.422	1815.8	3.8624	0.019	0.10121	0.84278
	<b>Phyla</b>						
	Depth level	68.344	3287.5	2.2562	0.076	0.39196	0.39196
<b>RA</b>	<b>LTID</b>						
	Latitude*	21.639	1912.7	33.705	0.027	0.91827	0.91827
	Collection Method*	20.075	86.783	2.0797	0.02	0.041664	0.95993
	Depth average	17.162	52.218	1.6714	0.379	0.02507	0.985
	<b>Family</b>						
	Latitude*	21.639	1912.7	33.705	0.026	0.91827	0.91827
	Collection Method*	20.075	86.783	2.0797	0.025	0.041664	0.95993
	Depth average	17.162	52.218	1.6714	0.365	0.02507	0.985
	<b>Order</b>						
	Latitude*	21.381	1891.2	35.093	0.029	0.92124	0.92124
	Collection Method*	20.057	78.514	1.8882	0.041	0.038246	0.95949
	Depth average	17.15	51.993	1.6681	0.382	0.025327	0.98482
	<b>Class</b>						
	Latitude*	21.416	1657.7	30.542	0.017	0.91056	0.91056
	Collection Method*	19.889	82.406	2.0494	0.017	0.045266	0.95583
	Depth average	16.74	51.705	1.8007	0.38	0.028402	0.98423
	<b>Phylum</b>						
	Latitude*	17.958	279.84	10.297	0.048	0.77438	0.77438
	Longitude	15.329	49.227	3.0475	0.075	0.13622	0.9106
	Depth average	14.74	13.057	0.67832	0.598	0.036131	0.94673

Table 18 RELATE test for PA and RA macrofauna data. Taxonomic level (LTID, Family, Order, Class and Phyla) indicated in the 'taxonomic level' column. Table also shows the sample statistic, significance and number of permutations.

	Taxonomic level	Sample stat (RHO)	Significance	Number of permutations
PA	<b>LTID</b>	0.843	0.1	999
	<b>Family</b>	0.823	0.2	999
	<b>Order</b>	0.813	0.1	999
	<b>Class</b>	0.815	0.2	999
	<b>Phyla</b>	0.286	1.9	999
RA	<b>LTID</b>	0.802	3.7	999
	<b>Family</b>	0.802	3.1	999
	<b>Order</b>	0.802	3.3	999
	<b>Class</b>	0.802	4.1	999
	<b>Phyla</b>	0.672	12	999

Table 19 PERMANOVA table of the PA and RA meiofauna data RA or PA indicated in the 'data set' column, Taxonomic level column indicates the taxonomic level the test was run at (LTID, family, order, class, phylum). F-value indicated in the 'Pseudo-F' column and p-value indicated in the 'P(Perm)' column. \* on a p-value indicates a significant result.

Data type	Taxonomic group	Source	df	SS	MS	Pseudo-F	P(perm)	perms	P(MC)
RA	LTID **	bioregion	1	1911.1	1911.1	33.373	0.099	10	0.004
RA	Family **	bioregion	1	1911.1	1911.1	33.373	0.098	10	0.003
RA	Order **	bioregion	1	1889.8	1889.8	34.772	0.095	10	0.003
RA	Class **	bioregion	1	1656.3	1656.3	30.266	0.092	10	0.004
RA	Phylum **	bioregion	1	278.86	278.86	10.138	0.106	10	0.026
PA	LTID **	bioregion	2	19176	9587.9	15.808	0.001	815	0.001
PA	Family **	bioregion	2	17920	8959.9	15.21	0.002	829	0.001
PA	Order **	bioregion	2	17104	8551.9	17.197	0.001	816	0.001
PA	Class **	bioregion	2	14753	7376.5	16.198	0.001	835	0.001
PA	Phylum *	bioregion	2	3585.6	1792.8	2.6135	0.035	640	0.088

Table 20 PERMANOVA mains test for the presence/absence benthic and pelagic fauna group. Taxonomic level is indicated in bold and in an individual row in the 'bioregion' column. The bioregions that are being compared are indicated in the 'Bioregion' column. \*\* on the bioregion indicates a significant p-value and a \* indicates a close to significant p-value. P-values indicated in the 'P(perm)' column and t-value indicates in the 't' column. P(MC) is the Monte Carlo test which is used as the p-value when there are permutations are below 100.

Groups	t	P(perm)	Unique perms	P(MC)
<b>LTID</b>				
Mediterranean, North Pacific **	4.4826	0.03	56	0.001

Mediterranean, New Zealand **	3.8206	0.044	16	0.003
North Pacific, New Zealand **	2.8907	0.11	10	0.031
<b>Family</b>				
Mediterranean, North Pacific **	4.3064	0.017	56	0.002
Mediterranean, New Zealand **	3.859	0.045	16	0.001
North Pacific, New Zealand **	2.8907	0.119	10	0.029
<b>Order</b>				
Mediterranean, North Pacific **	4.5595	0.019	56	0.001
Mediterranean, New Zealand **	4.1997	0.036	21	0.001
North Pacific, New Zealand **	2.9419	0.102	10	0.025
<b>Class</b>				
Mediterranean, North Pacific **	4.6437	0.016	56	0.001
Mediterranean, New Zealand **	3.7213	0.054	21	0.009
North Pacific, New Zealand**	2.7922	0.096	10	0.0363
<b>Phyla</b>				
Mediterranean, North Pacific*	1.8654	0.065	56	0.08
Mediterranean, New Zealand	1.2809	0.295	16	0.23
North Pacific, New Zealand *	2.0809	0.075	7	0.058

Table 21 Table showing the average dissimilarity (%) of methane seeps within the bioregions at all taxonomic levels. Data set indicates the data set the information came from (PA/RA).

Data set	Bioregion	Average Dissimilarity		
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		LTID	Family	Order	Class	Phyla
PA	Mediterranean & North Pacific	90.18	85.5	83.11	79.66	45.57
	Mediterranean & New Zealand	95.91	85.03	81.51	73.66	39.31
	North Pacific & New Zealand	55.11	55.11	53.95	41.48	27.89
RA	North Pacific & New Zealand	35.14	40.7	40.44	37.95	15.54

Table 22 Table showing the average similarity (%) of methane seeps within the bioregions at all taxonomic levels. Data set indicates the data set the information came from (PA/RA).

Data set	Bioregion	Average similarity				
		LTID	Family	Order	Class	Phyla
PA	Mediterranean	61.39	62.28	66.48	66.95	58.56
	North Pacific	71.25	71.25	71.25	77.01	77.66
	New Zealand	80	80	84.21	82.35	100
RA	North Pacific	90.6	90.6	90.6	90.78	94.75
	New Zealand	87.16	87.16	87.86	87.5	89.8

Table 23 DISTLM of the PA meiofauna split by bioregion. Environmental factors included in the model are in the 'Environmental Factor' column, f-value is in the 'Pseudo-F' column and P-Value is in the 'P' column. Significant p-values are noted in the group column by a '\*' on the environmental factor. The 'prop' column shows the proportion of the variation in the data explained by that variable. The 'cumul.' column shows the cumulative portion of variation in the data sets that the value on the row and the rows above explain.

Bioregion	Environment al factor	AIC	SS(trace)	Pseudo-F	P	Prop.	Cumul.
Mediterranean	No factors in the model						
North Pacific	Lon	16.127	779.04	4.5587	0.353	0.8201	0.8201