

Patterns in vertical distribution and their potential effects on transport of larval benthic invertebrates in a shallow embayment

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Supplement 1. Autocorrelation of each taxonomic group

Calculation of mean depth distribution (MDD)

The vertical distribution for 7 larval taxa at each sampling time was characterized using mean depth distribution (MDD) calculated for each sampling time j as the weighted average:

$$MDD_j = \frac{1}{N_j} \sum_{i=1}^n z_i n_{ij}$$

where z_i = mean depth of interval i , n_{ij} = number of larvae collected at depth i at time j , and N_j = total number of larvae sampled at time j (Tapia et al. 2010). For each larval taxon, the MDD reflects the larval concentration at the mean depth of any given profile. The time series of MDD for each taxon (gastropods, bivalves, polychaetes, bryozoans, asteroids, carideans, brachyurans) during each sampling period (full moon, quarter moon) was used for autocorrelation analysis.

Table S1. Autocorrelation explaining the similarity between the mean depth distribution (MDD) of each taxon (gastropods, bivalves, polychaetes, bryozoans, asteroids, carideans, brachyurans) as a function of the time separation between them. Plankton were sampled at a 2 h temporal frequency, over a 36 and 26 h period, during a spring (full moon: 6–7 Aug 2009) and neap (quarter moon: 12–13 Aug 2009) tide, respectively. **Bold** values indicate significantly correlated variables; r = correlation coefficient and p = p-value

Taxon	Time lag	Cross-correlations								
		Full moon						Quarter moon		
		0 h	2 h	4 h	6 h	8 h	0 h	2 h	4 h	
Gastropods	r	1.000	0.518	0.265	0.229	0.148	1.000	0.234	0.044	
	p	<0.001	0.033	0.322	0.412	0.613	<0.001	0.464	0.899	
Bivalves	r	1.000	0.682	0.354	0.208	0.219	1.000	0.362	0.268	
	p	<0.001	0.003	0.178	0.456	0.451	<0.001	0.248	0.425	
Polychaetes	r	1.000	0.766	0.541	0.221	-0.072	1.000	0.301	0.144	
	p	<0.001	<0.001	0.030	0.429	0.807	<0.001	0.341	0.673	
Bryozoans	r	1.000	0.253	-0.132	-0.349	-0.388	1.000	0.476	-0.252	
	p	<0.001	0.327	0.626	0.202	0.170	<0.001	0.118	0.454	
Asteroids	r	1.000	0.350	-0.153	-0.189	0.058	1.000	0.510	-0.074	
	p	<0.001	0.168	0.571	0.500	0.845	<0.001	0.090	0.829	
Carideans	r	1.000	0.271	-0.210	0.021	0.090	1.000	0.246	0.209	
	p	<0.001	0.294	0.435	0.942	0.761	<0.001	0.440	0.538	
Brachyurans	r	1.000	0.294	-0.064	-0.049	-0.136	1.000	0.253	-0.051	
	p	<0.001	0.253	0.815	0.862	0.643	<0.001	0.427	0.882	

Supplement 2. Correlations of physical variables

Table S2. Pearson correlation coefficients for all pairs of normalized physical variables: z = depth (m), T = temperature ($^{\circ}\text{C}$), S = salinity, σ_t = density (kg m^{-3}), Fl = fluorescence (relative fluorescence units), w = vertical velocity (cm s^{-1}), v = north-south velocity (cm s^{-1}), and u = east-west velocity (cm s^{-1}). Bold values indicate significantly correlated variables; n = sample size

		z	T	S	σ_t	Fl	w	v	u
z	r	1	-0.927	0.797	0.926	0.137	-0.141	-0.011	0.107
	p		<0.001	<0.001	<0.001	0.172	0.079	0.896	0.185
	n	186	163	116	116	101	155	155	155
T	r		1	-0.884	-0.992	0.124	0.132	0.017	-0.167
	p	-		<0.001	<0.001	0.218	0.123	0.848	0.051
	n		163	116	116	101	137	137	137
S	r			1	0.931	-0.335	0.004	0.104	0.082
	p	-	-		<0.001	0.002	0.965	0.307	0.424
	n			116	116	83	98	98	98
σ_t	r				1	-0.230	-0.079	-0.051	0.087
	p	-	-	-		0.037	0.438	0.619	0.395
	n				116	83	98	98	98
Fl	r					1	-0.092	-0.032	0.077
	p	-	-	-	-		0.402	0.770	0.482
	n					101	85	85	85
w	r						1	0.326	-0.350
	p	-	-	-	-	-		<0.001	<0.001
	n						155	155	155
v	r							1	-0.068
	p	-	-	-	-	-	-		0.398
	n							155	155
u	r								1
	p	-	-	-	-	-	-	-	
	n								155

Supplement 3. Simple linear regression between larval abundance and physical variables

Table S3. Results of simple linear regression explaining patterns in the normalized larval abundance [$\log(x + 2)$ transformed] of different taxonomic groups in relation to different normalized physical and biological variables. Simple regressions used to determine the variables included in multiple regressions. z = depth (m), T = temperature ($^{\circ}\text{C}$), S = salinity, σ_t = density ($\text{kg m}^{-3}-1000$), Fl = fluorescence, w = vertical velocity (cm s^{-1}), v = north-south velocity (cm s^{-1}), u = east-west velocity (cm s^{-1}); $-/+$ = negative or positive relationship; NS = not significant ($p > 0.01$); df for each regression are shown in parentheses below each factor

Taxon		Simple regression							
		z (1,184)	T (1,161)	S (1,114)	σ_t (1,114)	Fl (1,99)	w (1,153)	v (1,153)	u (1,153)
Gastropods	direction	+	-	+	+				
	adj. R^2	0.232	0.142	0.100	0.180	NS	NS	NS	NS
	F-value	57.01	27.75	13.71	26.296				
	p-value	<0.001	<0.001	<0.001	<0.001				
Bivalves	direction	+	-	+	+				
	adj. R^2	0.421	0.366	0.334	0.475	NS	NS	NS	NS
	F-value	135.3	94.63	58.54	105.9				
	p-value	<0.001	<0.001	<0.001	<0.001				
Polychaetes	direction	+	-	+	+				
	adj. R^2	0.366	0.414	0.354	0.486	NS	NS	NS	NS
	F-value	107.663	115.5	64.12	109.5				
	p-value	<0.001	<0.001	<0.001	<0.001				
Bryozoans	direction					+			
	adj. R^2	NS	NS	NS	NS	0.471	NS	NS	NS
	F-value					90.09			
	p-value					<0.001			
Asteroids	direction	-	+	-	-			+	
	adj. R^2	0.380	0.367	0.273	0.433	NS	NS	0.061	NS
	F-value	114.2	94.77	44.26	88.93			11.01	
	p-value	<0.001	<0.001	<0.001	<0.001			0.001	
Carideans	direction	+	-		+	+			
	adj. R^2	0.124	0.042	NS	0.049	0.167	NS	NS	NS
	F-value	27.18	8.175		6.959	21.01			
	p-value	<0.001	0.005		0.01	<0.001			
Brachyurans	direction	-	+						
	adj. R^2	0.047	0.060	NS	NS	NS	NS	NS	NS
	F-value	10.04	11.37						
	p-value	0.002	0.001						