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Supplement of

Geomorphic influences on the contribution of vegetation to soil C accumulation and accretion in *Spartina alterniflora* marshes

Tracy Elsey-Quirk and Viktoria Unger

Correspondence to: Tracy Elsey-Quirk (tquirk@lsu.edu)

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Table S1: Multivariate correlations and associated correlation probabilities for environmental parameters in saline marshes of Delaware Bay and Barnegat Bay, NJ. Only parameters with significant correlations are shown. Properties related to hydrology and soils are have a blue and brown background, respectively.

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Parameter	Marsh elevation	% time flooded	MHW	MWL	MLW	Tidal range	# flooding events/yr	LOG flood duration	Salinity	LOGIT soil N	LOGIT soil organic matter	Soil bulk density	LOG long-term mineral sedimentation rate
Marsh elevation (cm, NAVD88)	1.00									-0.85		0.78	0.75
	<0.0001									0.0004		0.0027	0.0046
LOGIT % time flooded		1.00	0.71	0.97	0.94			0.84					
		<0.0001	0.0089	<0.0001	<0.0001			0.0006					
MHW (cm)		0.71	1.00	0.83	0.74	0.85			-0.69				
		0.0089	<0.0001	<0.0001	0.0007	<0.0001			0.0409				
MWL (cm)		0.97	0.83	1.00	0.95			0.74					
		<0.0001	<0.0001	<0.0001	<0.0001			0.0007					
MLW (cm)		0.94	0.74	0.95	1.00			0.82					
		<0.0001	0.0007	<0.0001	<0.0001			<0.0001					
Tidal range (cm)			0.85			1.00	0.81		-0.87				
			<0.0001			<0.0001	<0.0001		0.0023				
# flooding events/yr						0.81	1.00		-0.68				
						<0.0001	<0.0001		0.0428				
LOG flood duration (hr)		0.84		0.74	0.82			1.00					
		0.0006		0.0007	<0.0001			<0.0001					
Salinity			-0.69			-0.87	-0.68		1.00				
			0.0409			0.0023	0.0428		<0.0001				
LOGIT soil N (%)	-0.85									1.00	0.74	-0.93	-0.96
	0.0004									<0.0001	0.0054	<0.0001	<0.0001
LOGIT soil organic matter (%)										0.74	1.00	-0.78	-0.84
										0.0054	<0.0001	0.0025	0.0005
Soil bulk density (g/cm ³)	0.78									-0.93	-0.78	1.00	0.94
	0.0027									<0.0001	0.0025	<0.0001	<0.0001
LOG mineral sedimentation rate (g/m ² /yr)	0.75									-0.96	-0.84	0.94	1.00
	0.0046									<0.0001	0.0005	<0.0001	<0.0001

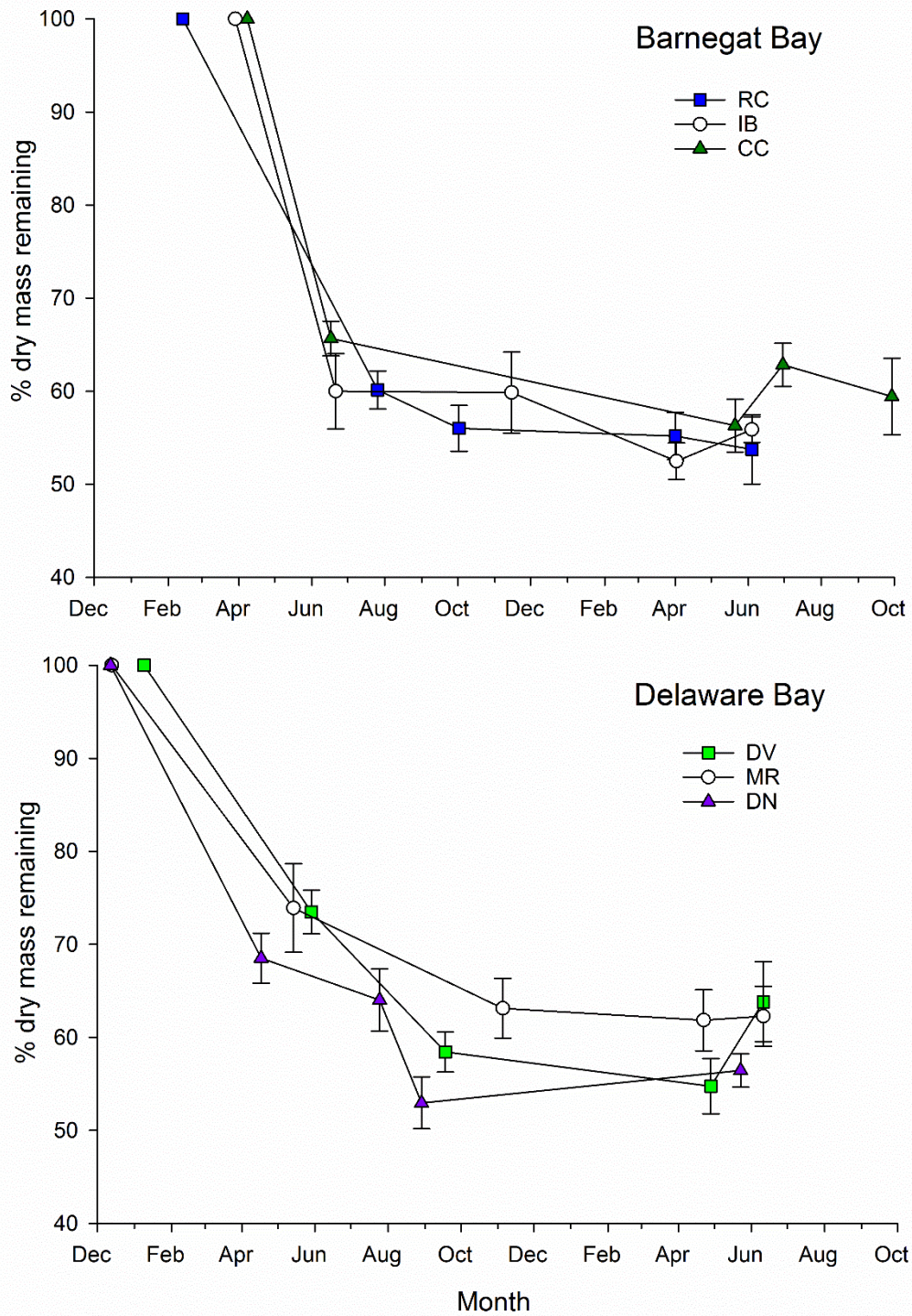


Figure S1. Mass loss from litterbags over time in three salt marshes in Barnegat Bay and three salt marshes in Delaware Bay from 2013 – 2014 (n = 5, ± standard error).

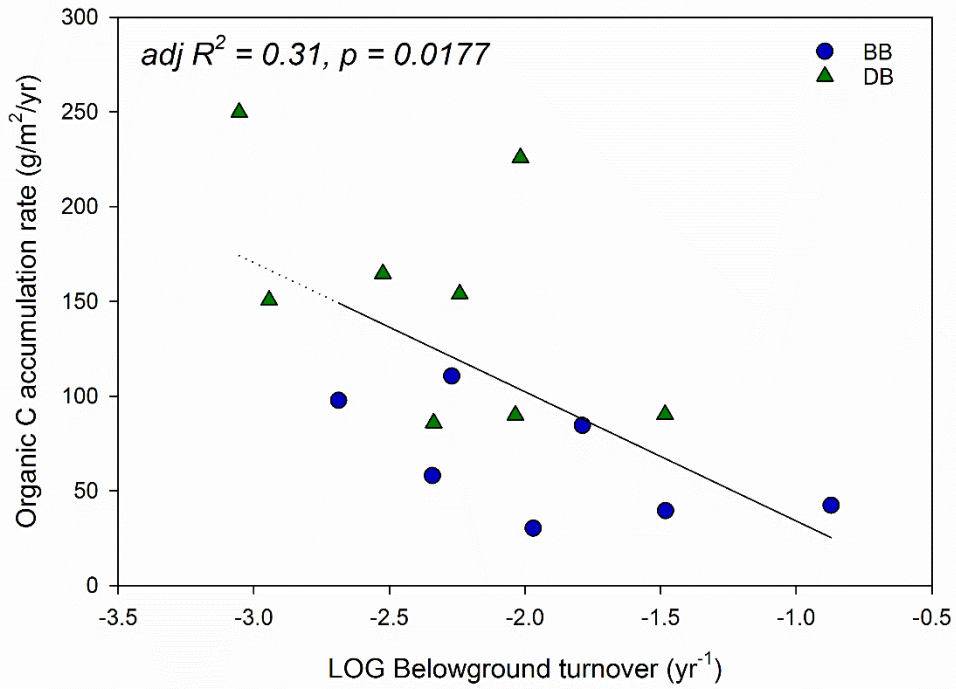
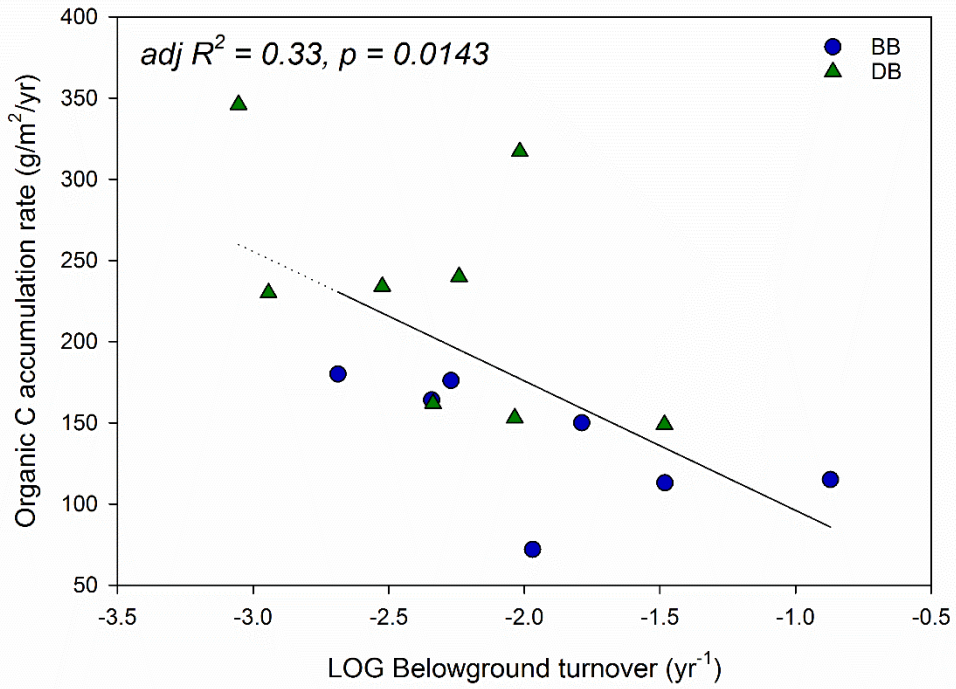


Figure S2. Relationship between belowground turnover and total organic and labile C accumulation rate for *Spartina alterniflora*-dominated marshes.

DATASETS

ENVIRONMENTAL DATA

Estuary	Site	Plot	Core elev (cm, NAVD88)	Tidal range (cm)	MLW (cm)	MHW (cm)	# flooding events/yr	Avg duration of flooding (hrs)	% time flooded	Soil bulk density (g/cm3)	Soil N density (g N/cm3)	Salinity	
BB	CC	1	27.86	4.98	-9.82	-4.84	96		4	4.4	0.294	0.002485555	37.97
BB	CC	2	28.36	5	-8	-3	97		4	6.8	0.2862	0.00215039	38
BB	CC	3	31.15	5.42	-7.57	-2.15	145	5.17	7.6	0.2616	0.002093022	39.68	
BB	IB	1	8.26	6.55	5.09	11.64	22	346	89	0.1492	0.002159654	34.34	
BB	IB	2	14.64	7	3	10	25	330	85	0.1242	0.001847437	30	
BB	IB	3	12.55	8.11	1.17	9.28	24.6	297	84	0.19	0.003115275	26.42	
BB	RC	1	10.43	14.57	-0.87	13.7	341	16.17	74.9	0.1652	0.002119821	20.76	
BB	RC	2	-10.34	13	1	14	300	25	65	0.128	0.00242051	20.6	
BB	RC	3	-7	12.59	-2.5	10.09	270	19.89	59.4	0.1364	0.002457591	20.53	
DB	DN	1	75.7	15.14	-0.4	14.74	106	61.7	74.9	0.387	0.001853826	15.67	
DB	DN	2	73.28	15	-1	14	90	53	70	0.366	0.001893196	13	
DB	DN	3	51.4	20.83	-2.89	17.94	331	16.28	59.4	0.287	0.001871886	11.43	
DB	DV	1	87.1	7.02	-10.62	-3.6	149	2.24	3.8	0.3444	0.001808486	18.1	
DB	DV	2	65.68	11	-6	5	160	25	11	0.4152	0.002035312	17	
DB	DV	3	62.89	14.63	-5.66	8.97	306	16.82	19.2	0.1854	0.001934515	16.06	
DB	MR	1	67.86	22.4	-3.01	19.39	511	6.69	39.6	0.5154	0.002521271	7.37	
DB	MR	2	35.21	22	1	23	400	8	40	0.3834	0.001695065	7	
DB	MR	3								0.417	0.002179907	6	

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STANDING STOCK VEGETATION DATA

Estuary	Site	Plot	Stem density (#/m2)	AB biomass (g/m2)	95% rooting depth	Live BG bio (g/m2)	Coarse dead BG (g/m2)	Fine BG (g/m2)	TOTAL BG (g/m2)
BB	CC	1	2076	415.12	19	1340.088712	1469	7119.868297	9928.957009
BB	CC	2	3640	383.28	17	3928.081167	1280	9723.09266	14931.17383
BB	CC	3	4112	287.32	18	3382.03093	1038	10155.21369	14575.24462
BB	IB	1	108	9.96	20	1168.551884	520	4463.706211	6152.258096
BB	IB	2		0	20	1936.048531	1309	11339.05221	14584.10074
BB	IB	3	1372	270.12	19	1600.150473	1026	10948.64983	13574.8003
BB	RC	1	772	75.28	18	781.8438278	221	6711.789964	7714.633792
BB	RC	2	292	67.24	18	820.8083266	194	2291.006724	3305.81505
BB	RC	3	488	194.24	20	559.5582944	425	4214.550497	5199.108791
DB	DN	1	1724	307.92	35	1848	1379	6137.829764	9364.829764
DB	DN	2	1732	329.64	45	2725	1716	6426.551956	10867.55196
DB	DN	3	1568	423	57	2795	94	4315.035488	7204.035488
DB	DV	1	1484	264.8	22	1942.508685	522	5227.062333	7691.571018
DB	DV	2	484	84.8	26	1857	659	4385.594796	6901.594796
DB	DV	3	1736	352.08	21	1982	887	9509.408139	12378.40814
DB	MR	1	308	487.36	31	3452.115951	903	3643.645799	7998.76175
DB	MR	2	912	779.92	26	1445.672288	895	1863.072184	4203.744473
DB	MR	3	616	726.04	34	1268.53851	1231	2026.02004	4525.558549

BELOWGROUND INGROWTH AND DECAY

Estuary	Site	Plot	Max(Number of days)	Root prod (g/m ² /yr)	Root turnover (yr ⁻¹)	% dry mass remaining	Decay Constant (k)
DB	Dennis	1	452	222.804123	0.120565002	62.41134752	
DB	Dennis	2	452	148.536082		58.15602837	3.5
DB	Dennis	3	452	271.363996	0.096365056	51.77304965	1.9
DB	Dennis	4	452	88.5503567		55.31914894	4.4
DB	Dennis	5	452	217.091197	0.070119896	54.60992908	4.1
DB	Dividing	1	567	421.265337	0.216923448	79.43262411	3.9
DB	Dividing	2	567	95.638617		55.31914894	1.9
DB	Dividing	3	567	79.6988475	0.042688188	56.73758865	3.7
DB	Dividing	4	567	234.542323		65.24822695	3
DB	Dividing	5	567	177.614575	0.086641256	62.41134752	2.5
BB	HP	1	539	210.795319	0.15730994	55.31914894	15.6
BB	HP	2	539	268.284952		73.75886525	10.7
BB	HP	3	539	366.496407	0.093303566	63.12056738	
BB	HP	4	539	282.65736		51.06382979	6
BB	HP	5	539	196.422911	0.058078921	53.90070922	6.8
BB	IBSP	1	515			58.15602837	8.3
BB	IBSP	2	515			52.4822695	8.6
BB	IBSP	3	515			59.57446809	5.3
BB	IBSP	4	515	45.1265708		53.19148936	
BB	IBSP	5	515	137.886744	0.086179215	56.02836879	
DB	Maurice	1	523	128.371528	0.037187581	59.57446809	2.2
DB	Maurice	2	523	343.146969		65.95744681	3.4
DB	Maurice	3	523	177.745193	0.123007054	53.19148936	3.7
DB	Maurice	4	523	167.87046		60.28368794	6
DB	Maurice	5	523	550.516361	0.434161168	72.34042553	1
BB	Reedy	1	510	318.982917	0.408428831	49.64539007	8.1
BB	Reedy	2	510	81.0115344		51.77304965	3.6
BB	Reedy	3	510	106.327639	0.129509913	52.4822695	2.9
BB	Reedy	4	510	98.7328076		46.80851064	3.4
BB	Reedy	5	510	121.517302	0.217383366	68.08510638	11.1