Importance of sediment grain size to stocks and stability of organic carbon buried in seagrass soils

Supplementary material

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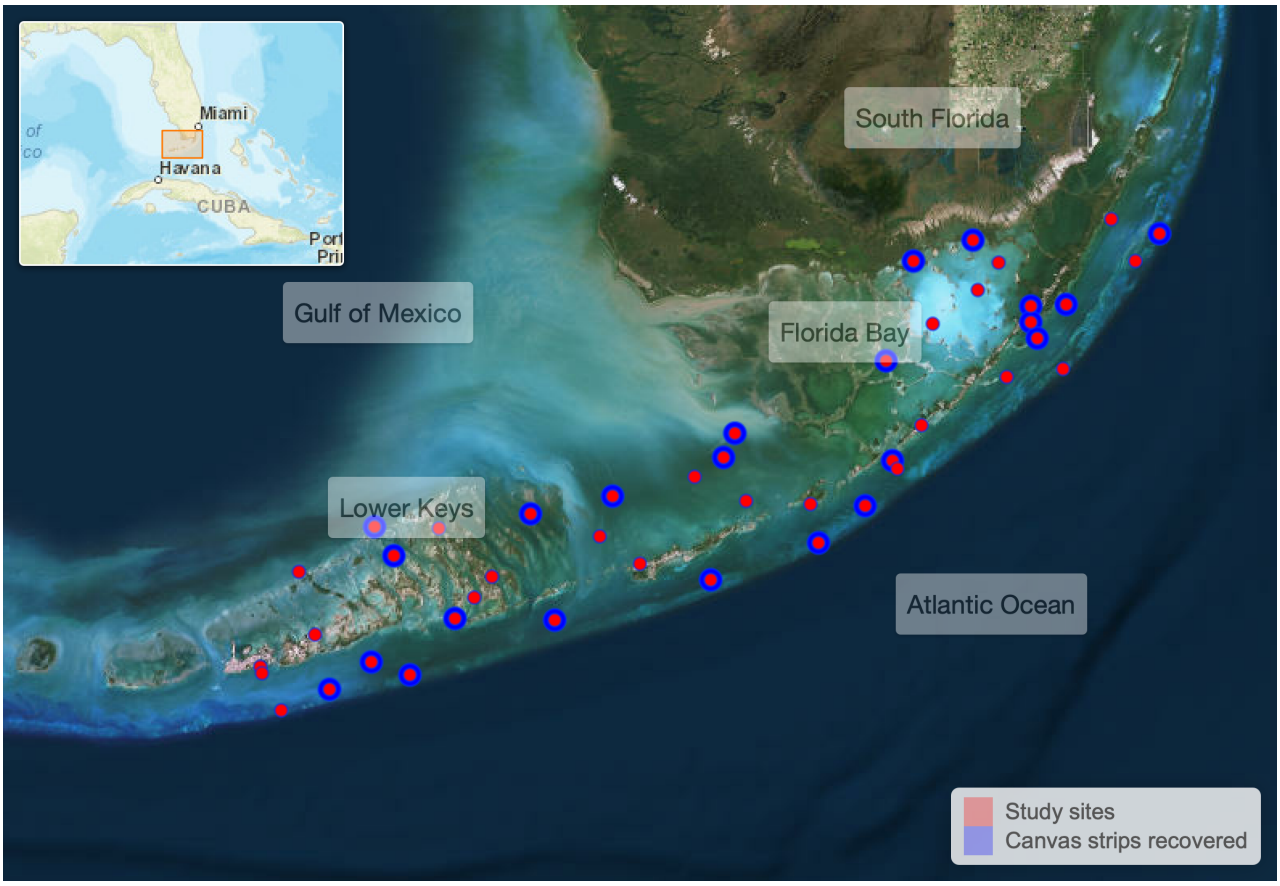


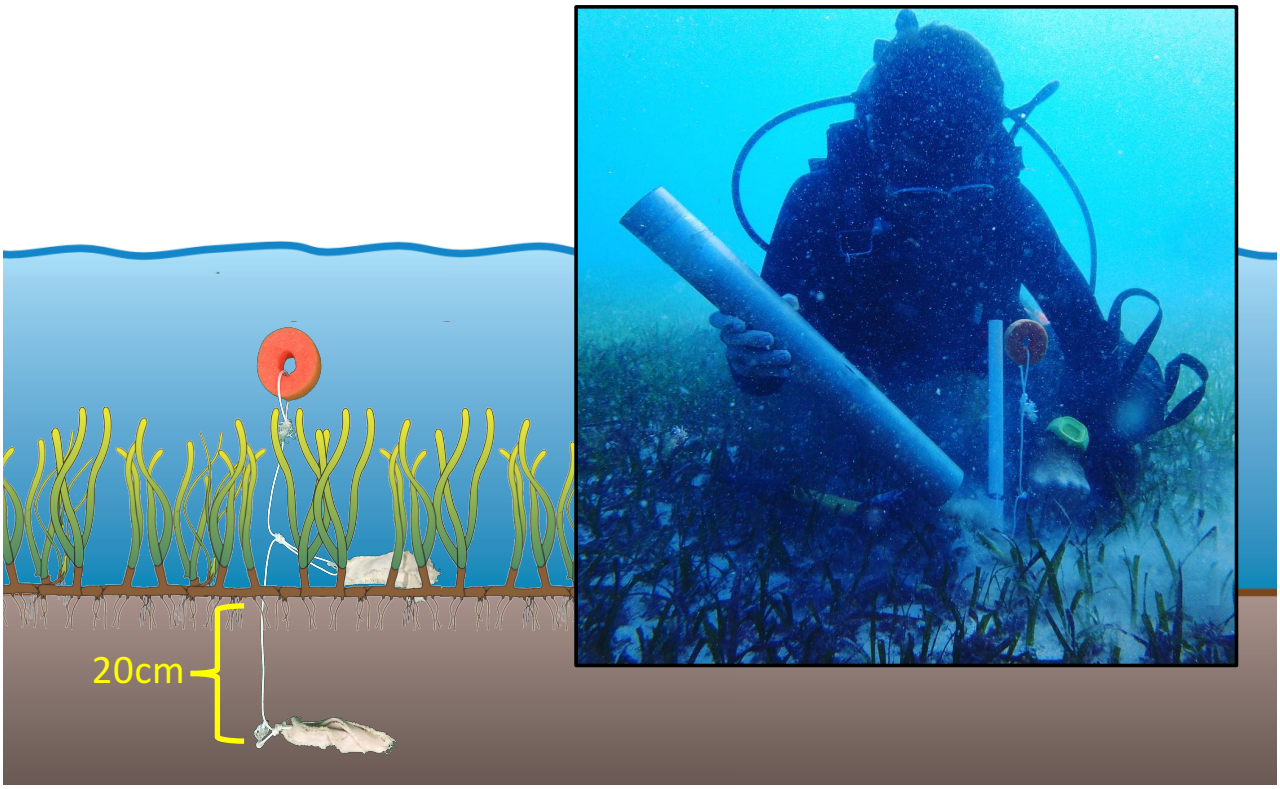
Online Resource 1 Map of South Florida including study sites and sites where canvas strips were successfully recovered.

Online Resource 2 Modified Braun-Blanquet abundance scores, their description, and their assigned percent coverage.

BB Score	Description	Assigned percent coverage
0	Species absent from quadrat	0
0.1	Species represented by a solitary short shoot, < 5% cover	0.1
0.5	Species represented by a few (< 5) shoots, < 5% cover	0.5
1	Species represented by many (> 5) shoots, < 5% cover	2.5
2	5% - 25% cover	15
3	25% - 50% cover	37.5
4	50% - 75% cover	62.5
5	75% - 100% cover	87.5

Online Resource 3 Sediment categories and their assigned ranking of increasing coarseness

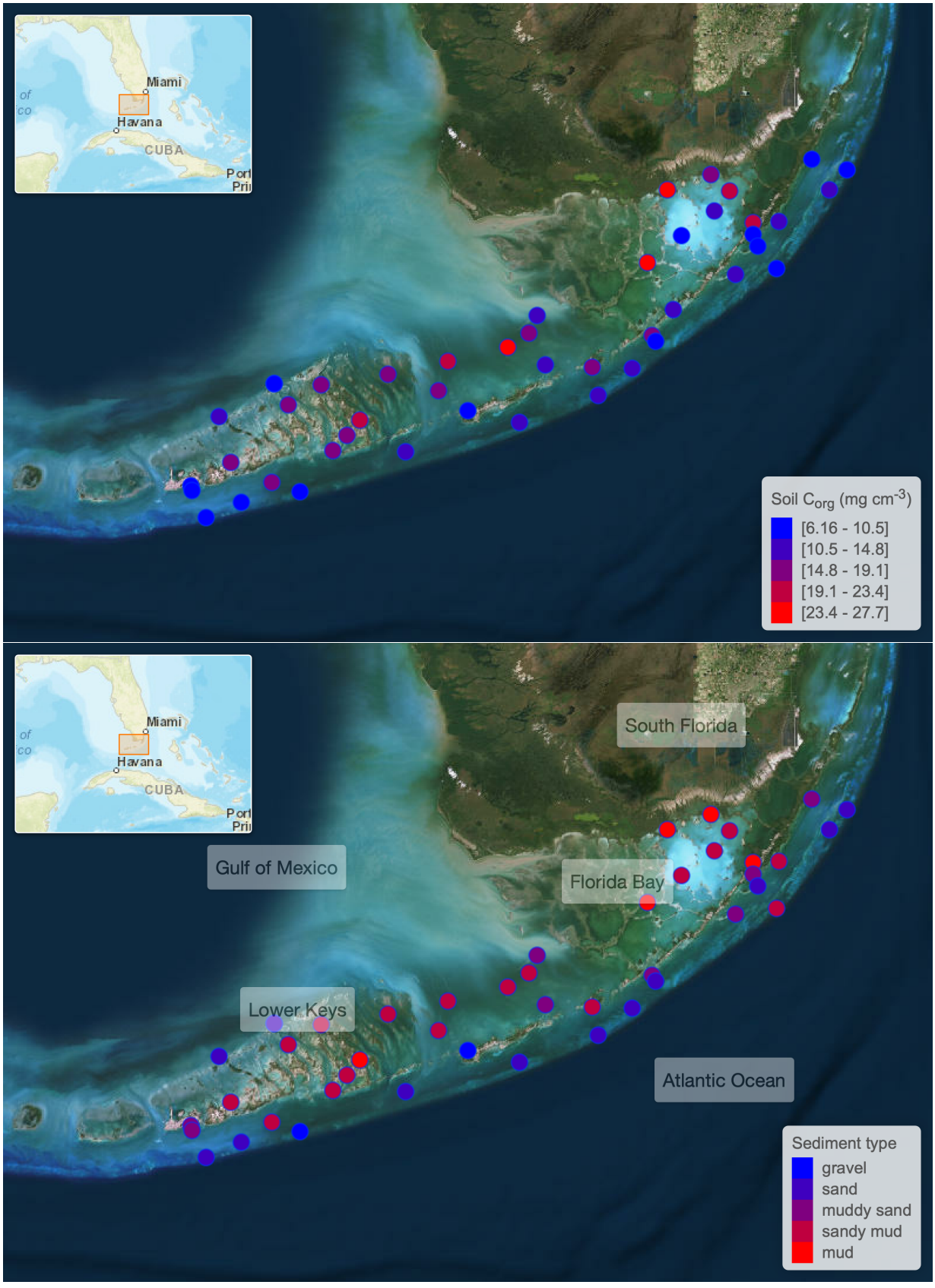
Sediment Category	Numerical Value	Description
Mud	1	Individual grains indistinguishable, easily compress in hand, sediment remains clumped after compression
Sandy Mud	2	Majority of grains indistinguishable but textured upon touch, easily compress in hand, sediment remains clumped after compression
Muddy Sand	3	Sandy texture upon touch but compresses in hand, sediment dissociates upon release with most grain falling in water column
Sand	4	Clearly distinguishable grains, difficult to compress in hand, grains fall quickly in water
Coarse Shell	5	Shell and shell remains dominate sediments (approx. 5-10 mm in size)
Halimeda-Hash	6	Remains of carbonate segments from *Halimeda* detritus (approx. 5-10 mm in size)
Rubble	7	Medium size rock (approx. 10-25 mm in size)
Live Coral	8	Continuous living coral
Rock	9	Bedrock or solid biogenic carbonate formations



Online Resource 4 Depiction of single canvas assay deployment apparatus. Strips were deployed at each site (n = 10) at the sediment-water interface and 20 cm depth with foam buoy for easy detection.

Online Resource 5 Summary of sediment and seagrass characteristics measured across study sites.

	n	Fraction of sites where present (%)	mean	SE	median	min	max
LOI (%)	46	-	6.9	0.6	5	3.3	19.5
C_{org} content (%)	46	-	2.4	0.2	1.7	0.7	8.6
dry bulk density (g cm^{-3})	46	-	0.7	0	0.7	0.2	1.5
C_{org} density (mg cm^{-3})	46	-	13.8	0.8	12.9	6.2	27.7
Mud content (%)	45	-	33.1	3.7	28	1.4	90.1
Thalassia coverage (%)	46	93.5	17.8	2.3	15.6	0	60.9
Syringodium coverage (%)	46	50	7.9	2.2	0.4	0	73.3
Halodule coverage (%)	46	34.8	1.5	0.7	0	0	22.3
Total seagrass coverage (%)	46	95.7	1.5	0.7	0	0	22.3
seagass canopy ht. (cm)	44	-	18.8	1.2	17.3	7.9	41.2



Online Resource 6 Map showing (*top)* surface soil C_{org} density, and (*bottom)* sediment type across 45 study sites of Florida Bay and the Florida Keys.

Online Resource 7 Summarized breakdown rates of canvas strips buried at 20 cm depth and deployed on the sediment surface

	Tensile strength at T_{final} (N)		Tensile stregth loss (% day^{-1})		Weight loss (% day^{-1})		Decay rate, k (year^{-1})		Decay rate, k (day^{-1})	
	Buried	Surface	Buried	Surface	Buried	Surface	Buried	Surface	Buried	Surface
Mean	18.377	31.508	0.00529	0.00499	0.0877	0.077	0.3504	0.3054	0.00096	0.000837
SE	2.683	6.556	0.00006	0.00018	0.005	0.0066	0.022	0.0277	0.00006	0.000076
Median	15.948	16.41	0.00528	0.0052	0.0815	0.0806	0.3215	0.3178	0.000881	0.000871
Max	49.229	127.051	0.00603	0.00628	0.1394	0.1221	0.5854	0.5028	0.001604	0.001377
Min	2.326	4.138	0.00456	0.00261	0.051	0.0191	0.1952	0.0708	0.000535	0.000194
All sites										
Mean ± SE	24.942 ± 3.636		0.00514 ± 0.00009		0.0824 ± 0.0042		0.3279 ± 0.0178		0.000898 ± 0.000046	

Online Resource 8 Literature review of decay rates in seagrass ecosystems

Substrate	Details	Additional Notes	Breakdown rate (day $^{-1}$)	Citation
Mixed litter	*Z. marina*	Laboratory experiment	0.004	Godshalk and Wetzel 1978
Seagrass leaves	*Z. marina*	Laboratory experiment	0.0035	Harrison 1982
Seagrass leaves	*Z. marina*	Laboratory experiment	0.018	Harrison 1982
Seagrass leaves	*T. testudinum*	Litterbag measurements	0.0149	Rublee and Roman 1982
Seagrass leaves	*Z. marina*	Litterbag measurements	0.0136	Pellikaan 1982
Seagrass leaves	*Z. marina*	Laboratory experiments	0.0357	Pellikaan 1984
Mixed litter	*Z. marina*	Laboratory experiments	0.0357	Pellikaan 1984
Seagrass leaves	*Z. marina*	Litterbag measurements	0.0124	Kenworthy and Thayer 1984
Seagrass leaves	*C. nodosa*	Litterbag measurements	0.023	Kenworthy and Thayer 1984
Seagrass rhyzomes	*T. testudinum*	Litterbag measurements	0.0007	Kenworthy and Thayer 1984
Seagrass roots	*T. testudinum*	Litterbag measurements	0.0183	Kenworthy and Thayer 1984
Seagrass roots	*Z. marina*	Litterbag measurements	0.0048	Kenworthy and Thayer 1984
Seagrass rhyzomes	*Z. marina*	Litterbag measurements	0.0035	Kenworthy and Thayer 1984
Seagrass leaves	*H. stipulacea*	Litterbag measurements	0.0032	Wahbeh and Mahasneh 1985
Seagrass leaves	*T. testudinum*	Litterbag measurements	0.0048	Newell et al 1984
Seagrass leaves	*T. testudinum*	Litterbag measurements	0.0279	Newell et al 1984
Seagrass leaves	*T. testudinum*	Literature review	0.0007	Harrison 1989
Seagrass leaves	*Z. marina*	Literature review	0.007	Harrison 1989
Seagrass leaves	*T. testudinum*	Literature review	0.017	Harrison 1989
Seagrass leaves	*T. testudinum*	Literature review	0.0085	Harrison 1989
Seagrass leaves	*T. testudinum*	Literature review	0.008	Harrison 1989
Seagrass leaves	*P. australis*	Literature review	0.0013	Harrison 1989
Seagrass leaves	*H. tasmanica*	Literature review	0.004	Harrison 1989
Seagrass leaves	*C. nodosa*	Laboratory experiments	0.0039	Peduzzi and Herndl 1991
Seagrass leaves	*P. oceanica*	Litterbag measurements	0.0088	Romero et al 1992
belowground biomass	*P. oceanica*	lepidochronology	0.0002	Romero et al 1992
belowground biomass	*P. oceanica*	lepidochronology	0.0006	Romero et al 1992
belowground biomass	*P. oceanica*	lepidochronology	0.0003	Romero et al 1992
Seagrass leaves	*Z. noltii*	Litterbag measurements	0.0164	Bourgues et al 1996
Seagrass leaves	*P. oceanica*	Oxygen uptake	0.003	Mateo and Romero 1996
Seagrass leaves	*P. oceanica*	Litterbag measurements	0.0068	Mateo and Romero 1996
Seagrass leaves	*P. oceanica*	Litterbag measurements	0.0091	Cebrian et al 1997
Seagrass leaves	*Z. marina*	Litterbag measurements	0.019	Cebrian et al 1997
Seagrass leaves	*C. nodosa*	Litterbag measurements	0.024	Cebrian et al 1997
Seagrass leaves	*P. oceanica*	Litterbag measurements	0.0205	Mateo and Romero 1997
Seagrass leaves	*C. nodosa*	Litterbag measurements	0.0086	Pérez et al 2001
Seagrass leaves	*C. nodosa*	Litterbag measurements	0.0157	Pérez et al 2001
Seagrass leaves	*T. testudinum*	Litterbag measurements	0.017	Fourqurean and Schrlau 2003
Seagrass rhyzomes	*T. testudinum*	Litterbag measurements	0.0032	Fourqurean and Schrlau 2003
Mangrove leaves	R. mangle	Litterbag measurements	0.0064	Fourqurean and Schrlau 2003
Seagrass leaves	*Z. noltii*	Litterbag measurements	0.016	Machás et al 2006
Seagrass leaves	*P. sinuosa*	Litterbag measurements	0.0068	Moore and Fairweather 2006
Seagrass leaves	*A. griffithii*	Litterbag measurements	0.0078	Moore and Fairweather 2006
Seagrass leaves	*A. antarctica*	Litterbag measurements	0.0116	Moore and Fairweather 2006
Seagrass leaves	Mixed species	Litterbag measurements	0.0094	Moore and Fairweather 2006
Seagrass leaves	*Z. muelleri*	Litterbag measurements	0.0152	Nicastro et al 2012
Seagrass leaves	*T. hemprichii*	Litterbag measurements	0.011	Chiu et al 2013
Seagrass rhyzomes	*T. hemprichii*	Litterbag measurements	0.0268	Yano et al 2013
Seagrass leaves	*T. hemprichii*	Litterbag measurements	0.0394	Yano et al 2013
Seagrass leaves	*Z. muelleri*	Litterbag measurements	0.0055	Trevathan-Tackett et al 2017

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