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SUPPLEMENTARY INFORMATION
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Seagrass ecosystems as a globally significant carbon stock

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Supplementary Material

Data used for analysis are archived on the United States National Science Foundation's Florida Coastal Everglades Long Term Ecological Research Program's Data Resources web page (http://fcelter.fiu.edu/data/related/)

Relationships between Loss on Ignition and C_{org} of seagrass soils

Organic matter content was more often reported in the assembled literature as loss on ignition (LOI) than as C_{org}. The range of LOI values encompassed all possible values, from 0% to 100% (Table S1); however, the median LOI value was 4.2%. Direct determination of C_{org} is methodologically more involved, and requires specialized equipment, compared to estimating organic content by (LOI). However, we did identify 1748 samples for which both Corg and LOI had been directly measured; these samples came from a broad variety of seagrass habitats (see the online dataset for identity of these samples). Because of regional data gaps in estimation of C_{org} storage, we examined whether LOI could be implemented to estimate C_{org}. LOI has been reported to lead to overestimation of organic matter content, and C_{org}, in carbonate rich sediments because of loss of water from carbonate minerals[1], so we examined the relationship between LOI and C_{org} to determine if a common relationship could be used to estimate C_{org} from LOI across similar ecosystems.

C_{org} of soils was significantly related to LOI (Figure S2), indicating that LOI can be used as a predictor of the C_{org} content of seagrass soils. However, a significant non-zero intercept indicated that there was mass loss on ignition even when there was no C_{org} content of the soils, suggesting that LOI is not a good proxy for C_{org} for very low C_{org} contents. For the entire range of the data, the slope of the relationship between LOI and C_{org} was 0.43 %C_{org} (% LOI)$^{-1}$ and the intercept was -0.33 ± 0.02; indicating that samples with no C_{org} content would have an LOI of ca. 0.77% dry weight. When we censored the data to only include LOI values <20%, the intercept was lower but still non- zero (-0.21 ± 0.03); consequently a sample with no C_{org} could be expected to lose 0.52% of its dry weight on ignition.

General patterns in DBD and C_{org} with depth in soil profiles

We examined the patterns in DBD and C_{org} with depth over the first meter of the soil profiles by calculating the slope of the linear relationship between depth and DBD and depth and $\log_{10}(C_{org}+1)$ for all soil profiles with DBD and Corg data available. We then calculated the mean and 95% confidence intervals of these slopes to describe the global average pattern in the change in these parameters with depth.

We used reported seagrass biomass and depth profiles of sediment properties (C_{org}, DBD) that extended to 1 m deep in the soil to calculate site-specific C_{org} storage, based on a 1 ha unit area. For profiles with DBD and C_{org} data with maximum depths between 20 cm and 95 cm, we used the relationships between depth and DBD and C_{org} to estimate the DBD and C_{org} at 5 cm intervals between the maximum depth and 1m for each core.

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Literature cited

1 Leong, L. S. & Tanner, P. A. Comparison of methods for determination of organic carbon in marine sediment. *Mar. Pollution Bull.* **38**, 875-879 (1999).

Table S1. Summary of collected data on seagrass biomass in dry weight units and soil properties from the global dataset.

	n	Range	Median	Mean ± 95%CI
Aboveground biomass Mg (dry weight) ha^{-1}	251	0.002 – 15.850	0.756	2.151 ± 0.364
Belowground biomass Mg (dry weight) ha^{-1}	251	0.002 – 50.957	1.542	5.008 ± 1.069
Total seagrass biomass Mg (dry weight) ha^{-1}	251	0.004 – 66.807	2.854	7.159 ± 1.399
Dry Bulk Density g (dry weight) mL^{-1}	2484	0.06 – 2.35	0.92	1.03 ± 0.02
Porosity %	1687	18.0 – 99.7	61.6	59.2 ± 0.8
Organic matter as LOI % of dry weight	2783	0.0 – 100.0	4.2	5.7 ± 0.3

Table S2. **Regional comparisons of C_{org} stores in seagrass ecosystems. ND = no data available**

Region	Living Seagrass Biomass MgC ha^{-1}			Soil C_{org} MgC ha^{-1}	
	n	Mean ± 95%CI		n	Mean ± 95%CI
Northeast Pacific	5	0.97 ± 1.02		1	64.4
Southeast Pacific	0	ND		0	ND
North Atlantic	50	0.85 ± 0.19		24	48.7 ± 14.5
Tropical Western Atlantic	44	0.84 ±0.17		13	150.9 ± 26.3
Mediterranean	57	7.29 ± 1.52		29	372.4 ± 74.5
South Atlantic	5	1.06 ± 0.51		5	137.0 ± 56.8
Indopacific	47	0.61 ± 0.26		8	23.6 ± 8.3
Western Pacific	0	ND		0	ND
South Australia	40	2.32 ± 0.63		9	268.3 ± 101.7
Global Average	251	2.51 ± 0.49		89	194.2 ± 20.2

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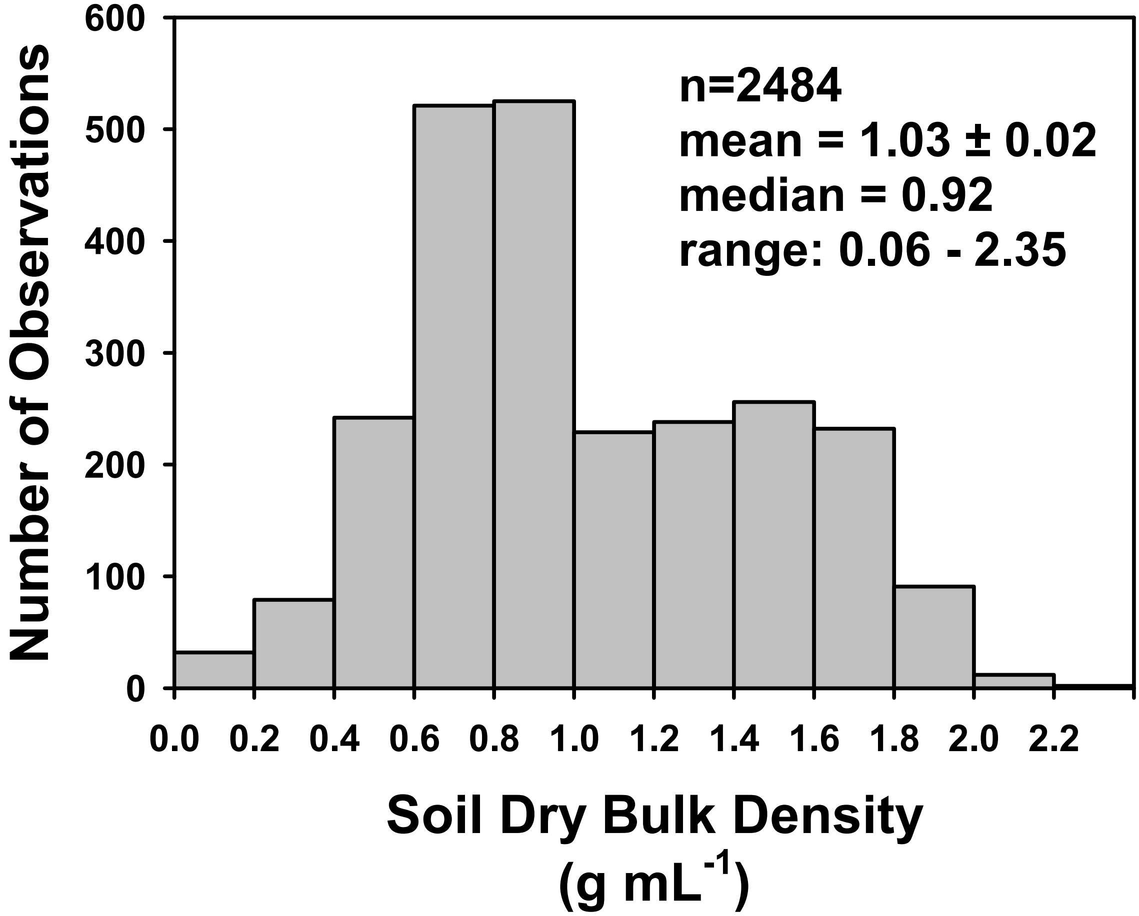

Figure S1. Frequency distribution of observations of soil Dry Bulk Density from seagrass meadows

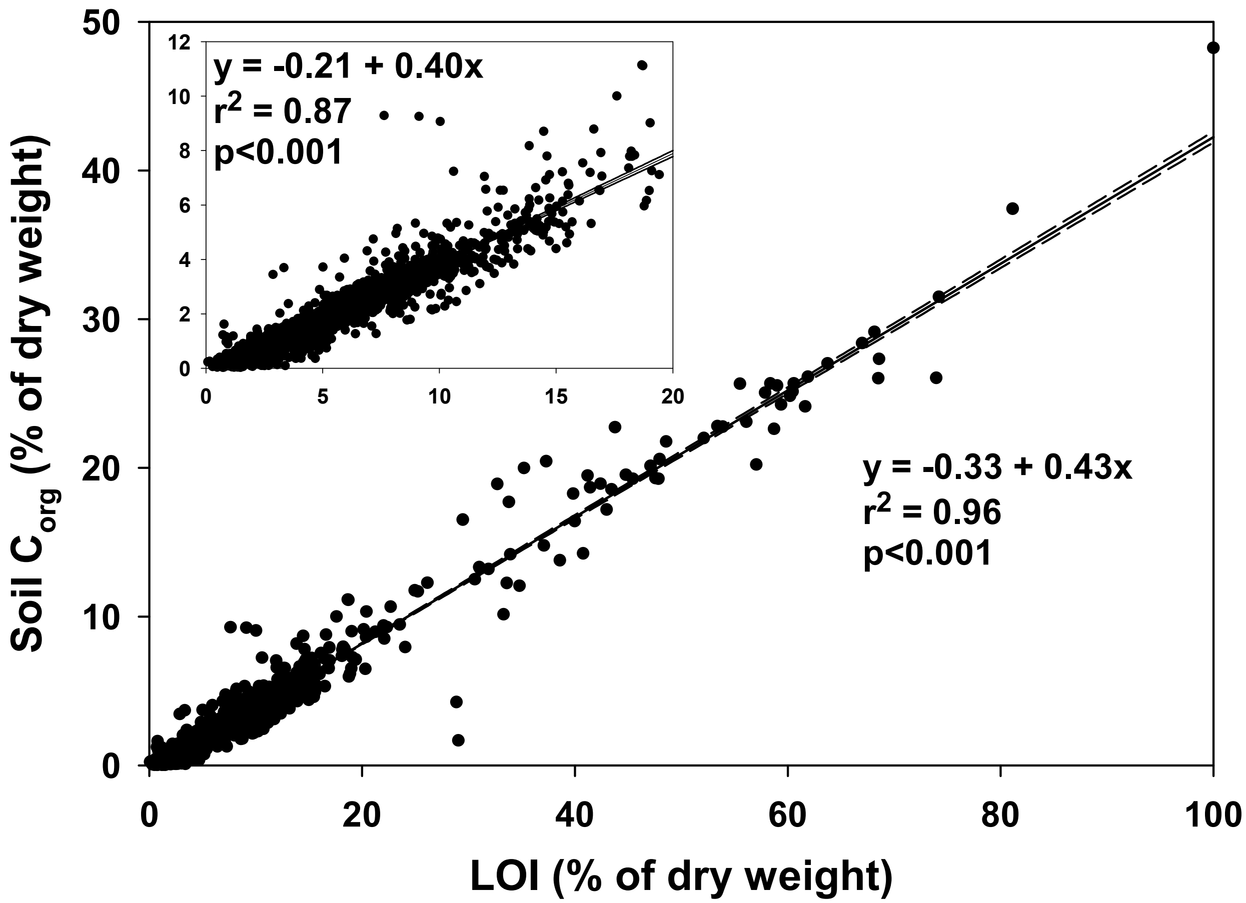

Figure S2. Relationship between LOI and Corg for seagrass soils (n=1748). Inset: focus on the majority of the data with LOI< 20% (n=1667)