

**Table S1: GPS coordinates of the sample locations**

	Low marsh	High marsh
Freshwater marsh	51° 7' 3.12" N 4° 16' 5.42" E	51° 7' 5.78" N 4° 16' 17.75" E
Brackish water marsh	51° 24' 10.71" N 4° 6' 22.18" E	51° 24' 17.47" N 4° 6' 22.46" E
Saltwater marsh	51° 21' 0.08" N 3° 43' 14.81" E	51° 20' 59.15" N 3° 43' 10.60" E

**Table S2: Aboveground, belowground and total biomass and biomass production, maximum rooting depth (m), organic carbon concentration (%) and  $\delta^{13}\text{C}$  signal (‰) for vegetation at the study sites. <sup>A</sup>For below-ground biomass the maximum root depth is given between brackets, <sup>B</sup>see Table 1 in main text, <sup>C</sup>Turnover rates are presented in table S3.**

	Vegetation type		Biomass (g dry weight m <sup>-2</sup> ) <sup>A</sup>	Annual biomass production (g DW m <sup>-2</sup> yr <sup>-1</sup> ) <sup>C</sup>	Organic carbon %	Nitrogen %	C:N	$\delta^{13}\text{C}$ (‰)
Freshwater low	<i>P. australis</i>	Above-ground	2775 ± 858	2775 ± 858	45.7 ± 0.5	1.12 ± 0.03	47.5 ± 2.0	-26.3 ± 0.2
		Litter	-	-	45.2 ± 0.8	1.00 ± 0.10	53.3 ± 7.6	-26.6 ± 0.2
		Below-ground	6400 ± 1943 (0.8m)	4352 ± 1321	42.1 ± 1.0	0.83 ± 0.11	61.3 ± 9.6	-26.2 ± 0.2
		Total	9175 ± 2124					
Freshwater high	<i>Salix</i> (leaves) <i>U. dioica</i>	Above-ground	215 ± 72	215 ± 72	42.9 ± 1.6	1.60 ± 0.02	31.9 ± 1.2	-30.5 ± 0.5
		Above-ground	202 ± 146	202 ± 146	43.1 ± 0.6	1.25 ± 0.03	40.7 ± 1.8	-29.6 ± 0.3
		Below-ground	160 ± 92 (0.35m)	34 ± 19	42.1 ± 0.7	1.33 ± 0.01	36.8 ± 0.2	-29.8 ± 0.1
		Total	577 ± 187					
Brackish water low	<i>E. athericus</i>	Above-ground	2331 ± 560	3754 ± 902	45.0 ± 0.4	0.96 ± 0.03	54.6 ± 2.6	-26.9 ± 0.3
		Below-ground	25 ± 8 (0.40m)	88 ± 28	34.4 ± 4.0	0.55 ± 0.03	73.1 ± 7.8	-28.3 ± 0.4
		Total	2356 ± 560					
Brackish water high	<i>E. athericus</i>	Above-ground	1746 ± 295	2811 ± 475	44.4 ± 0.7	0.96 ± 0.06	54.4 ± 2.1	-27.0 ± 0.3
		Below-ground	43 ± 14 (0.20m)	151 ± 49	35.2 ± 3.5	0.58 ± 0.04	68.5 ± 10.8	-27.9 ± 0.4
		Total	1789 ± 295					
Saltwater low	<i>S. anglica</i>	Above-ground	680 ± 163	1333 ± 319	39.5 ± 0.8	1.56 ± 0.10	29.6 ± 2.7	-14.0 ± 0.02
		Below-ground	1728 ± 399 (0.45m)	2177 ± 503	40.4 ± 1.7	1.19 ± 0.12	40.0 ± 4.8	-13.5 ± 0.3
		Total	2408 ± 431					
Saltwater high	Mixed vegetation <sup>B</sup>	Above-ground	1214 ± 331	1748 ± 477	40.3 ± 0.3	1.75 ± 0.04	26.9 ± 0.9	-24.7 ± 0.3
		Below-ground	11 ± 5 (0.45m)	22 ± 10	36.8 ± 1.9	1.67 ± 0.07	25.7 ± 0.9	-27.4 ± 0.2
		Total	1225 ± 331					

**Table S3: Turnover rates for above- and belowground biomass at the study sites. Vegetation type is given in table S2.**

**Aboveground biomass**

Site	Turnover time (yr <sup>-1</sup> )	Reference	Remark
Freshwater low	1	Soetaert <i>et al.</i> (2004)	-
Freshwater high	1	-	As only fallen vegetation is sampled the turnover rate is assumed to be 1 /yr
Brackish water low and high	1.61	Groenendijk (1984)	Marsh near Krabbendijke (Oosterschelde), calculated based on the paired-plot data
		Wolff <i>et al.</i> (1979)	Marsh near Stroodorpepolder (Oosterschelde), based on max biomass and biomass production
Saltwater low	1.96	Gray & Benham (1990)	Tidal marsh in the UK, based on primary production
		Groenendijk (1984)	Marsh near Krabbendijke (Oosterschelde), calculated based on his paired-plot data
Saltwater high	1.44	Groenendijk (1984)	Triglochin maritima, marsh near Krabbendijke (Oosterschelde), calculated based on his single-plot data
		Wolff <i>et al.</i> (1979)	Elymus athericus, marsh near Stroodorpepolder (Oosterschelde), based on max biomass and biomass production

**Belowground biomass**

Site	Turnover time (yr <sup>-1</sup> )	Reference	Remark
Freshwater low	0.68	Soetaert <i>et al.</i> , 2004)	Average value for roots and rhizomes
Freshwater high	0.21	Gill & Jackson (2000)	Salix bebbiana (Canada); Salix spp. (Alaska)
Brackish water low and high	3.5	Bouma <i>et al.</i> (2002)	Based on root ingrowth cores, marsh near Waarde (Westerschelde)
Saltwater low	1.26	Bouma <i>et al.</i> (2002)	Based on root ingrowth cores, marsh near Waarde (Westerschelde)
		Gray & Benham (1990)	Tidal marsh in the UK, based on primary production
Saltwater high	1.99	Bouma <i>et al.</i> (2002)	E. athericus, based on root ingrowth cores, marsh near Waarde (Westerschelde)
		Groenendijk & Vink-Lievaart (1987)	Triglochin maritima, average for 0-60 cm depth, Oosterschelde, based on biomass production / max. biomass

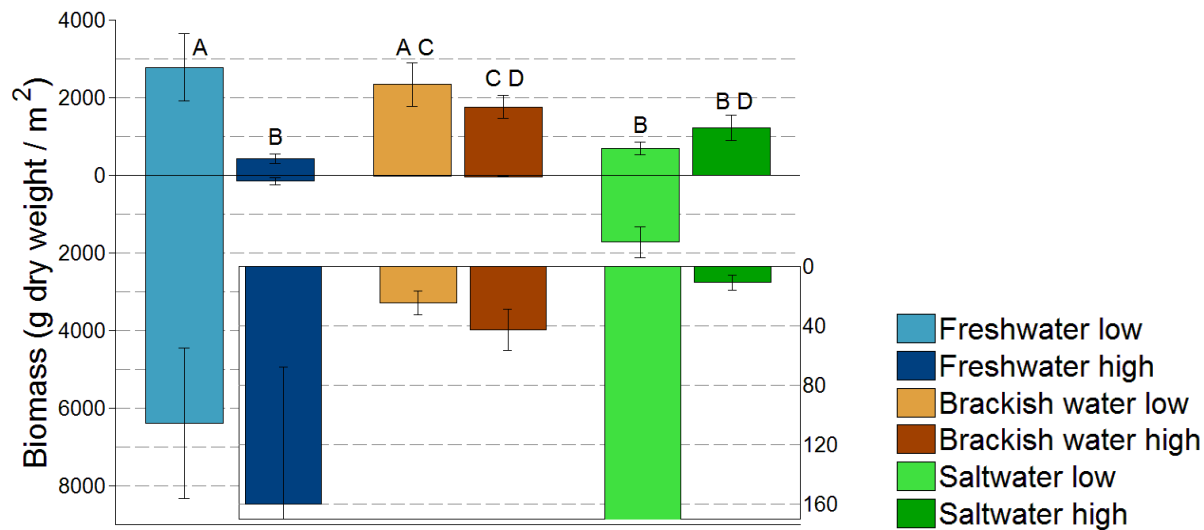


Figure S1: Total above- and belowground biomass for the study sites (g dry weight m<sup>-2</sup>) (the inset is a magnification of the root biomass). Significantly different aboveground biomass values between sites are denoted by different letters. Upward pointing bars represent aboveground biomass, downward pointing bars represent belowground biomass. Standard deviations for aboveground biomass are calculated based on 5 replicas, for root biomass on 3 replicas.

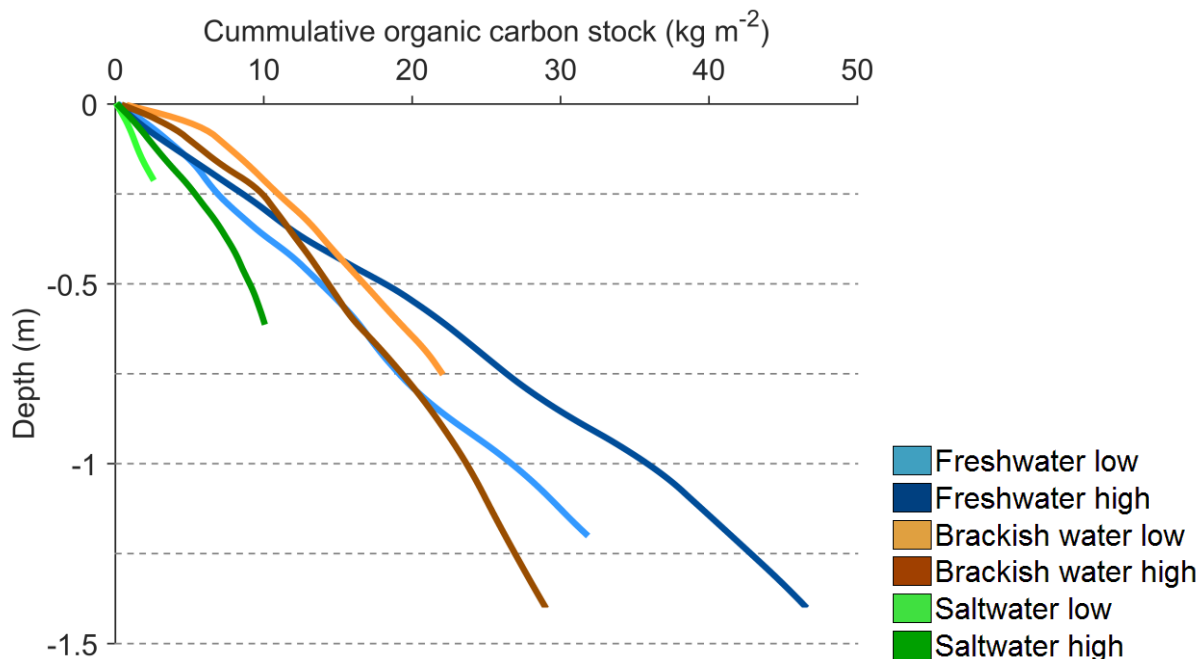
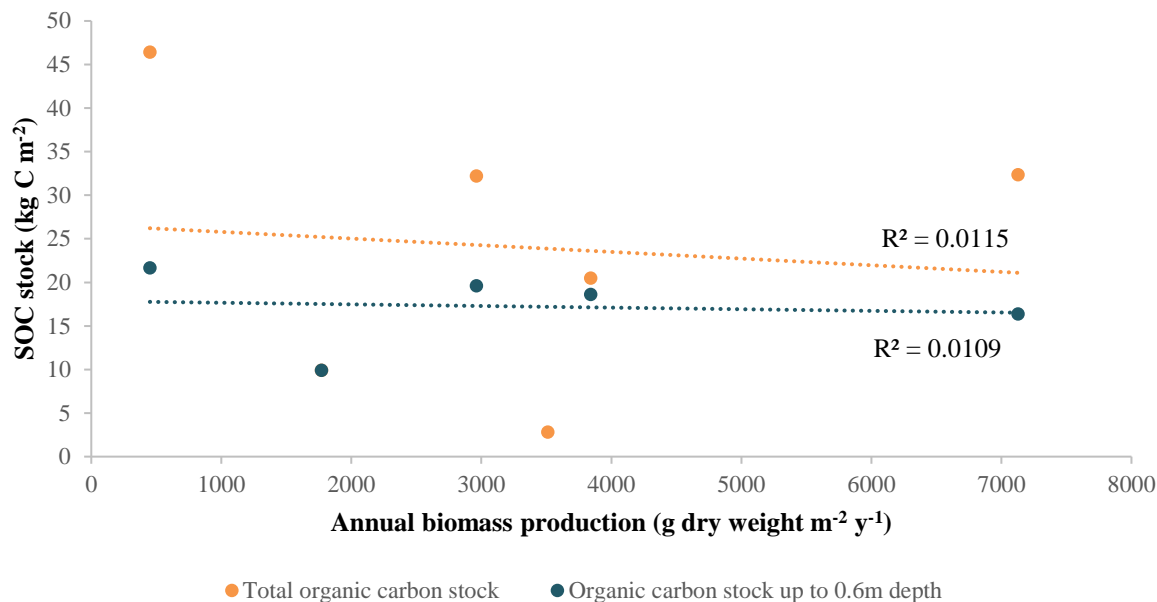


Figure S2: Depth profiles of the cumulative organic carbon stock for depth intervals of 0.01m. No standard deviations are shown to improve readability.



**Figure S3: Relationship between the total annual biomass production (above- and belowground) and soil organic carbon stock, for both total stocks and stocks down to 0.6m depth.**

### References

5 Bouma, T. J., Hengst, K., Koutstaal, B. P. and Soelen, J. Van: Estimating root lifespan of two grasses at contrasting elevation in a salt marsh by applying vitality staining on roots from in-growth cores, *Plant Ecol.*, 165, 235–245, 2002.

Gill, R. A. and Jackson, R. B.: Global patterns of root turnover for terrestrial ecosystems, *New Phytol.*, 147, 13–31, 2000.

Gray, A. J. and Benham, P. E. M., Eds.: *Spartina anglica - a research review*, HMSO, London., 1990.

10 Groenendijk, A. M.: Primary production of 4 dominant salt-marsh angiosperms in the southwestern Netherlands, *Vegetatio*, 57(2/3), 143–152, 1984.

Groenendijk, A. M. and Vink-Lievaart, M. A.: Primary production and biomass on a Dutch salt marsh: emphasis on the below-ground component, *Vegetatio*, 70, 21 – 17, 1987.

15 Soetaert, K., Hoffmann, M., Meire, P., Starink, M., Van Oevelen, D., Van Regenmortel, S. and Cox, T.: Modeling growth and carbon allocation in two reed beds (*Phragmites australis*) in the Scheldt estuary, *Aquat. Bot.*, 79, 211–234, doi:10.1016/j.aquabot.2004.02.001, 2004.

Wolff, W. J., Van Eeden, M. J. and Lammens, E.: Primary production and import of particulate organic matter on a salt marsh in The Netherlands, *Netherlands J. Sea Res.*, 13(2), 242–255, 1979.