SUPPLEMENTARY INFORMATION

Evaluating ocean alkalinity enhancement for carbon dioxide removal: evidence from a one-year saltmarsh field experiment

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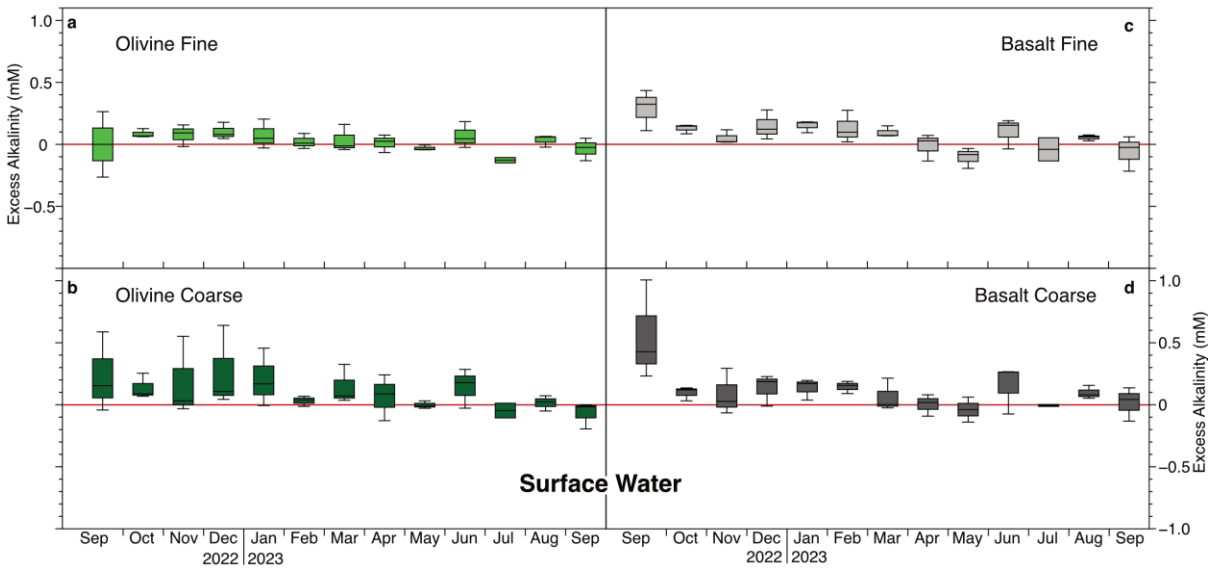
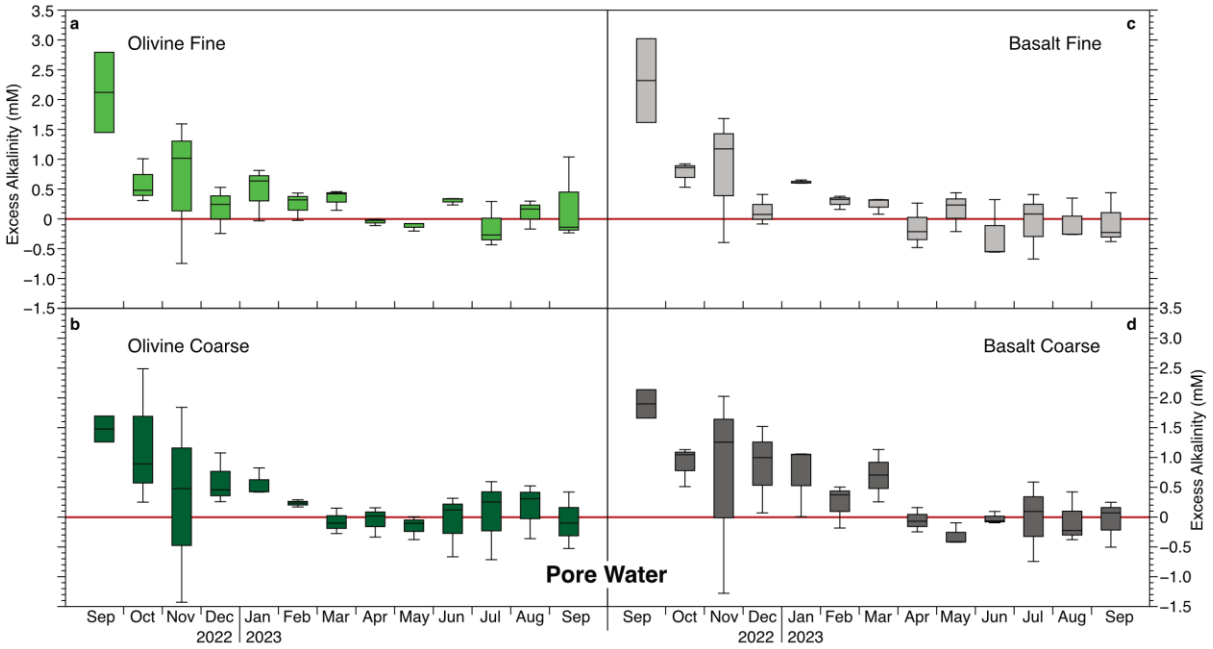
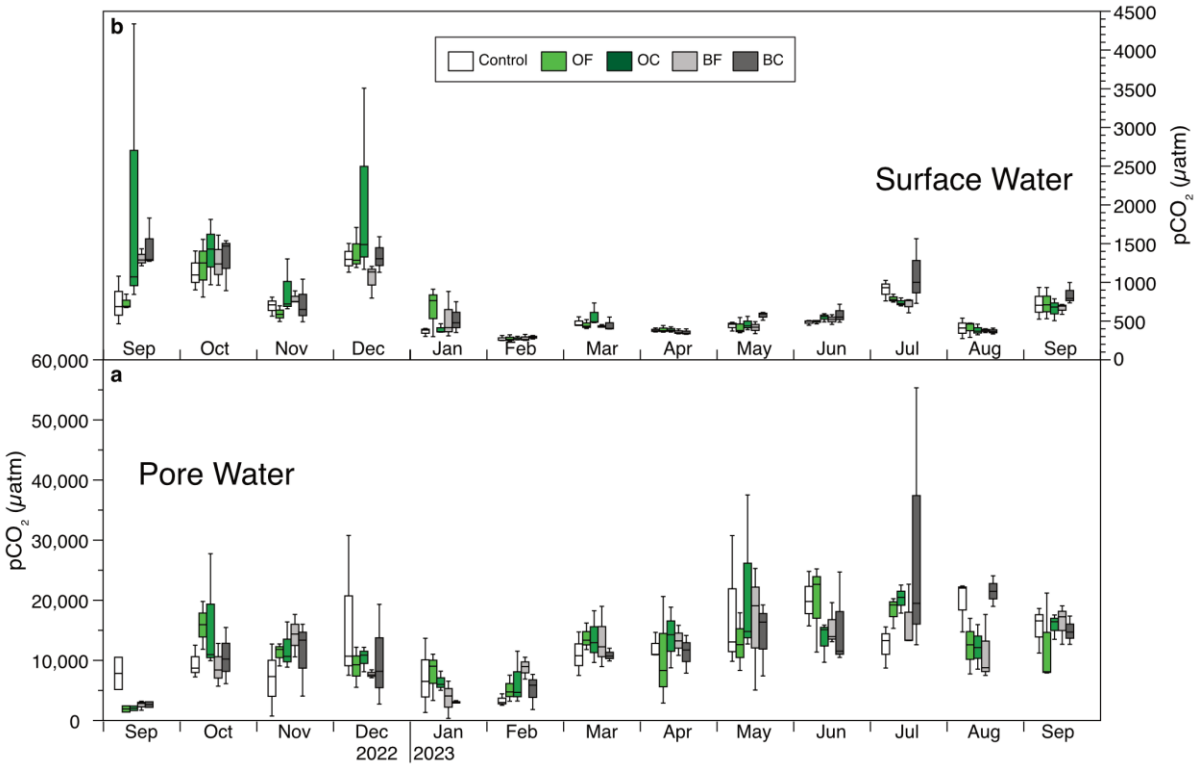
SUPPLEMENTARY FIGURES S1 To S5



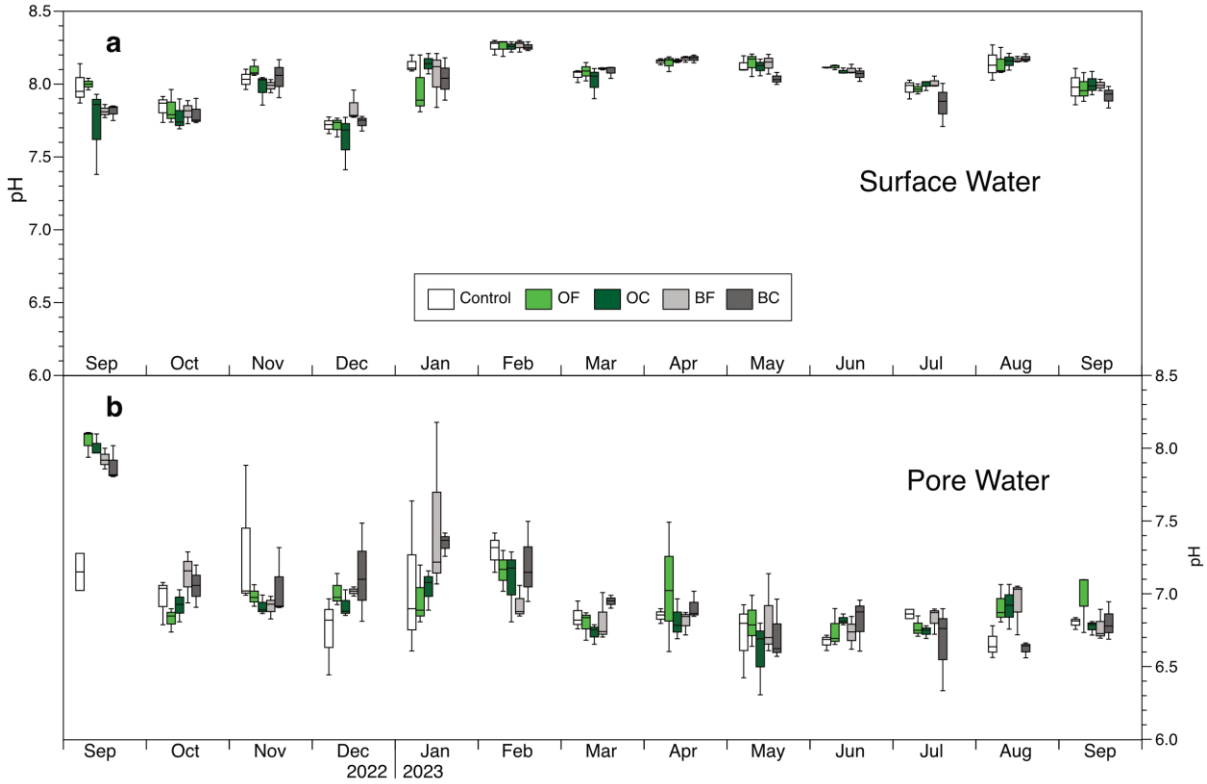
Supplementary Figure S1. Variation of excess alkalinity in the surface water of the experimental site from September 2022 to September 2023. Box plots showing excess alkalinity (treatment - control) for each treatment. (a) Olivine fine (b) Olivine coarse (c) Basalt fine and (d) Basalt coarse. Values above zero indicate higher alkalinity, values below zero indicate lower alkalinity in the treatments compared to the control.



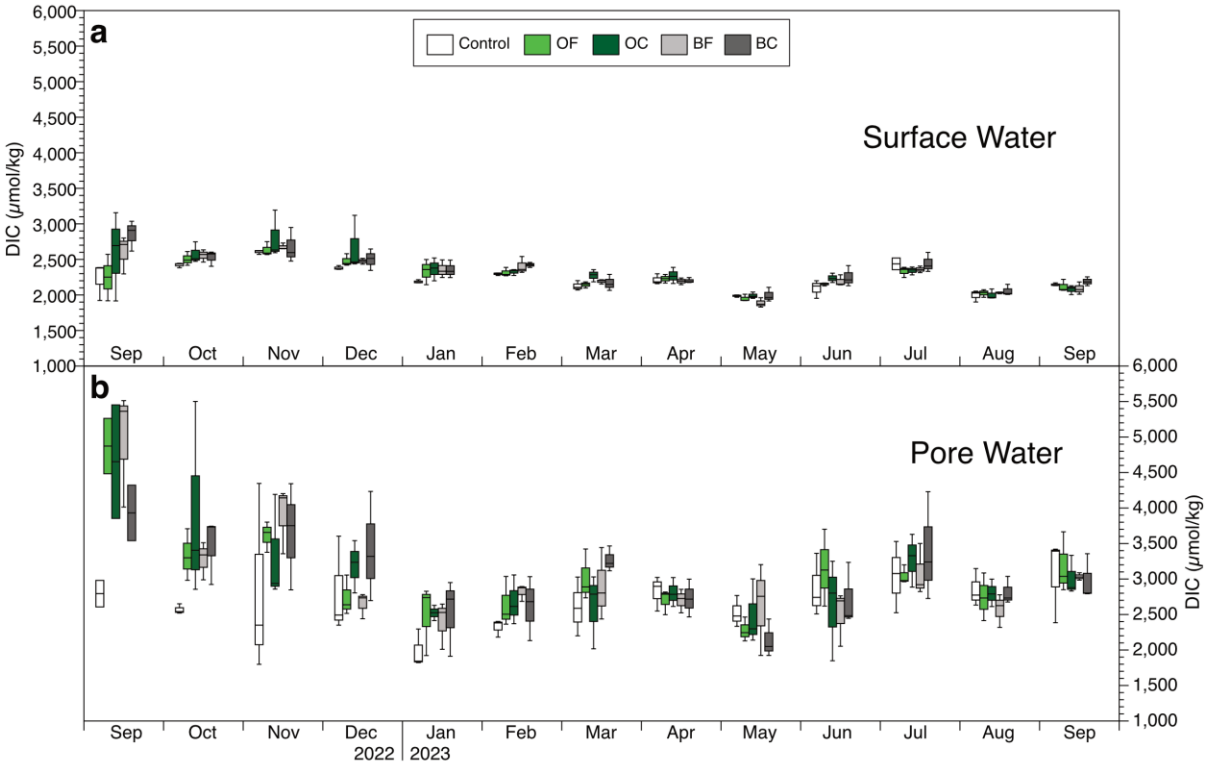
Supplementary Figure S2. Variation of excess alkalinity in the pore water of the experimental site from September 2022 to September 2023. Box plots showing excess alkalinity (treatment - control) for each treatment. (a) Olivine fine (b) Olivine coarse (c) Basalt fine and (d) Basalt coarse. Values above zero indicate higher alkalinity, values below zero indicate lower alkalinity in the treatments compared to the control.



Supplementary Figure S3. Variation in partial pressure of carbon dioxide (pCO_2) in surface and porewater samples at the experimental site from September 2022 to September 2023. pCO_2 was calculated from the total alkalinity, pH, temperature, salinity, and nutrient concentrations by using the CO2SYS software, version 25b06 (Lewis and Wallace, 1998). In **a** and **b**, the monthly box plots represent individual treatments in the following order: Control (white), Olivine Fine (OF, light green), Olivine Coarse (OC, dark green), Basalt Fine (BF, light grey) and Basalt Coarse (BC, dark grey). Each box plot shows the median (middle line), the 25th and 75th percentiles (box) and the minimum and maximum values (whiskers).



Supplementary Figure S4. The pH variation at the experimental site from September 2022 to September 2023. The pH box plots show the monthly variation in the control and each applied treatment. The pH was measured directly in the surface or pore water sample of each box. In **a** and **b**, the monthly box plots represent individual treatments in the following order: Control (white), Olivine Fine (OF, light green), Olivine Coarse (OC, dark green), Basalt Fine (BF, light grey) and Basalt Coarse (BC, dark grey). The box plots show the median (middle line), the 25th and 75th percentiles (box) and the minimum and maximum values (whiskers).



Supplementary Figure S5. Dissolved inorganic carbon (DIC) at the Experiment site from September 2022 to September 2023. The DIC box plots show the monthly variation in the control and each applied treatment. DIC (DIC = dissolved CO_2 + HCO_3^- + CO_3^{-2}) were calculated from the total alkalinity, pH, temperature, salinity, and nutrient concentrations by using the CO2SYS software, version 25b06 (Lewis and Wallace, 1998). In **a** and **b**, the monthly box plots represent individual treatments in the following order: Control (white), Olivine Fine (OF, light green), Olivine Coarse (OC, dark green), Basalt Fine (BF, light grey) and Basalt Coarse (BC, dark grey). The box plots show the median (middle line), the 25th and 75th percentiles (box) and the minimum and maximum values (whiskers).

SUPPLEMENTARY TABLE

Supplementary Table S1 – Estimation of carbon dioxide mass (g) in surface and pore water calculated for the first year of the experiment (September 2022 to September 2023), based on the flux measurements in each box, for the control and treatments.

Treatment	SW - CO2 in g per year	Difference between Treatment and Control	Difference (%)	PW - CO2 in g per year	Difference between Treatment and Control	Difference (%)
Control	134.89	-	-	282.23	0.00	0.00
Olivine Fine	154.12	19.23	12.48	324.54	42.32	13.04
Olivine Coarse	275.13	140.24	50.97	271.92	-10.30	-3.79
Basalt Fine	147.33	12.44	8.45	174.87	-107.35	-61.39
Basalt Coarse	210.79	75.90	36.01	232.49	-49.73	-21.39