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Scotland's national saltmarsh carbon resources: an assessment of organic carbon stocks and burial rates

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Scotland's saltmarshes bury and store organic carbon (OC) for extensive periods of time, and thus, could potentially contribute as a natural solution to combat climate change. Recent studies have calculated that the top 10cm of Scottish saltmarshes hold approximately 367,888 ± 102,278 tonnes of OC [1]. Despite this new understanding of the surficial OC stock, the rate at which OC is buried is largely unknown. This study focusses on 10 contrasting saltmarshes around Scotland and presents an in-depth analysis of their total organic carbon (TOC) stocks and burial rates. Chronology data (provided by radioisotope analysis) provides information on the age of saltmarsh soils, as well as OC accumulation rates. Additionally, stable isotope analysis ($\delta^{13}C$ and $\delta^{15}N$) allows improved understanding of carbon sources. Sediment carbon analysis, sediment descriptions and vegetation surveys were used to generate TOC stocks for each saltmarsh. The results showed that between 8,253 and 91,028 tonnes of OC is stored in these contrasting saltmarshes and OC burial rates range between 29.1 and 142.5 gC m^{-2} yr^{-1}. This work highlights the role that saltmarshes play as a natural component in coastal climate mitigation and their wider significance as blue carbon environments contributing to Scotland's natural capital.

[1] Austin, W., Smeaton, C., Riegel, S., Ruranska, P., Miller, L (2021). Blue carbon stock in Scottish saltmarsh soils. Scottish Marine and Freshwater Science, 12 (13)