EGU24-552, updated on 07 Dec 2024
https://doi.org/10.5194/egusphere-egu24-552
EGU General Assembly 2024

Blue Carbon Additionality: New Insights from the Radiocarbon Content of Saltmarsh Soils and their Respired CO_2

Alex Houston[1], Mark Garnett[2], and William Austin[1,3]

[1]School of Geography and Sustainable Development, University of St Andrews, St Andrews, United Kingdom
[2]National Environmental Isotope Facility, Scottish Universities Environmental Research Centre, East Kilbride, United Kingdom
[3]Scottish Association for Marine Science, Dunstaffnage, United Kingdom

International policy frameworks recognize the net drawdown and storage of atmospheric greenhouse gases through management interventions on blue carbon ecosystems (saltmarshes, mangroves, seagrasses) as potential emissions offset strategies. However, key questions remain around the 'additionality' of the carbon sequestered by these ecosystems, and whether some fraction of the organic carbon (OC) that does not derive from in-situ production (allochthonous) should be included in carbon budgets. This study compares the radiocarbon (^{14}C) contents of saltmarsh soils and CO_2 evolved from aerobic laboratory incubations to show that young OC is preferentially respired over aged OC, and that the latter is also vulnerable to remineralisation under oxic conditions. The results from this study are the first to empirically show the remineralisation of aged OC from a blue carbon ecosystem. This highlights that management interventions which reduce the exposure of saltmarsh soils to oxic conditions support the inclusion of some portion of allochthonous OC in carbon budgets. Elevated temperature incubations provide preliminary evidence that the predominant source of respired OC will not change under predicted future warmer conditions. Saltmarsh typology also influences the ^{14}C content of both the bulk soil and respired CO_2, highlighting the importance of site selection for optimized blue carbon additionality.