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Sedimentary Carbon Stocks: A National Assessment of Scotland's Fjords.

Craig Smeaton (1), William Austin (1,2), Althea Davies (1), and John Howe (2)

(1) University of St-Andrews, Department of Geography & Sustainable Development, St-Andrews, United Kingdom (cs244@st-andrews.ac.uk), (2) Scottish Association for Marine Science, Scottish Marine Institute, Dunbeg, Oban, PA37 1QA

Coastal sediments have been shown to be globally significant repositories for carbon (C) with an estimated 126.2 Tg of C being buried annually (Duarte et al. 2005). Though it is clear these areas are important for the long-term storage of C the actual quantity of C held within coastal sediment remains largely unaccounted for. The first step to understanding the role the coastal ocean plays in the global C cycle is to quantify the C held within these coastal sediments.

Of the different coastal environment fjords have been shown to be hotspots for C burial with approximately 11 % of the annual global marine carbon sequestration occurring within fjordic environments (Smith et al. 2015). Through the development of a joint geophysical and geochemical methodology we estimated that the sediment in a mid-latitude fjord holds 26.9 ± 0.5 Mt of C (Smeaton et al., 2016), with these results suggesting that Scottish mid-latitude fjords could be a significant unaccounted store of C equivalent to their terrestrial counterparts (i.e. peatlands).

Through the application of the joint geophysical and geochemical methodology developed by Smeaton et al (2016) to a number of other mid-latitude fjords, we will create detailed estimations of the sedimentary C stored at these individual sites. Using these detailed C stock estimations in conjunction with upscaling techniques we will establish the first national estimation of fjordic sedimentary C stocks. The data produced will allow for the sedimentary C stocks to be compared to other national C stocks, such as the Scottish peatlands (Chapman et al. 2009) and forestry (Forestry Commission, 2016).

Alongside quantifying this large unaccounted for store of C in the coastal ocean this work also lays foundations for future work to understand the role of the coastal ocean in the global C cycle.

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