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Carbon Burial at the Land Ocean Interface: Climate vs Human Drivers.

Craig Smeaton (1), Xingqian Cui (2,3), Thomas Bianchi (2), John Howe (4), William Austin (1,4)

(1) University of St-Andrews, Department of Geography & Sustainable Development, St-Andrews, United Kingdom (cs244@st-andrews.ac.uk), (2) Department of Geological Sciences, University of Florida, Gainesville, FL 32611, USA, (3) Department of Earth, Atmospheric, and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, MA, USA, (4) Scottish Association for Marine Science, Scottish Marine Institute, Oban, PA37 1QA, UK

Fjords are connectors between the terrestrial and marine systems and are known as globally significant hotspots for the burial (Smith et al., 2014) and long-term storage (Smeaton et al., 2016) of carbon (C). The glacial geomorphology of fjords and their catchment results in the terrestrial and marine environments being strongly coupled more so than other estuary types. The clearest example of this is the terrestrial C subsidy to these sediment, it is estimated that globally 55-62% of C held in fjord sediments are terrestrially derived (Cui et al., 2016). Yet it is largely unknown how climatic and human forcing drives the transfer of terrestrial C to the marine sediment.

Here we, examine the role of late Holocene climate and human activity on the transfer of C from the terrestrial to marine environment along the North Atlantic Margin. Loch Sunart a Scottish fjord sits at the land ocean interface of the North Atlantic. The catchment of the fjord has been shown to be sensitive to local and regional climatic change (Gillibrand et al., 2005) and the fjord sediments have been able to record these changes in Climate (Cage and Austin, 2010). Using a long (22m) sedimentary record we will further develop our understanding of mid to late Holocene regional climate and its impact on terrestrial C transfer to the coastal ocean. Alongside this we will examine the role of humans on the landscape and their impact on the transfer of terrestrial C on the coastal ocean. The results from this study will further our understanding of the long-term drivers of terrestrial C transfer to the coastal ocean. Potentially this research provides insights on future C transfers under a changing future climate allowing the importance of fjords as a climate regulation service to be reassessed.