OXYGENTATION OF LONG TERM ANOXIC BY FJORD, SWEDEN: IMPLICATIONS FOR ORGANIC CARBON SOURCES AND DECAY

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Anthropogenic activity has significantly altered our planet and exacerbated global climate change. In particular, increases in the abundance of atmospheric greenhouse gases (e.g., CH_4 and CO_2), largely responsible for global warming, has disrupted the balance (e.g., sources, sinks and exchange rates) of the global carbon cycle. Sediment in the coastal margin store over 80% of the total organic carbon (OC) in the global ocean, thus playing a vital role in the global carbon cycle. Recent research has identified fjords as estuarine sites with efficient organic OC burial rates, largely due to their stratification, burying 11% of oceanic OC though only covering 0.1% of the ocean area. Fjords receive and bury autochthonous marine and allochthonous OC, or marine OC (OC_{mar}) and terrestrial OC (OC_{terr}). Here, we present data on recent and historical changes of OC inputs and burial in the By fjord, a predominantly anoxic Swedish fjord. This fjord was also the site of a 2.5-year long engineering experiment (2010-2013) in which oxygenated surface waters were pumped into deep waters. Sediment cores collected from 2009 and 2012, when the fjord was naturally anoxic and forced oxic, respectively, were examined for bulk elemental (C, δ^{13}C, N, δ^{15}N), radionuclide (^{137}Cs), and lignin biomarker analyses. The OC burial rates for the By fjord ranged from 24-38 g OC m^{-2} yr^{-1}, which agrees with estimates for regional fjords in NW Europe. Bulk elemental analyses suggest OC_{terr} and OC_{mar} burial. Lignin concentrations characterizes the OC_{terr} as non-woody angiosperm material that is not degraded once delivered to the sediments, proving the efficient burial of OC_{terr}. Relative contributions of OC_{terr} and OC_{mar} will be determined using a stable isotope mixing model and will be included in the presentation. Additional sites above the sill will be analyzed for greater temporal and spatial changes in OC burial.

PRESENTER BIO: Emily Watts is a second year PhD student in Dr. Bianchi's biogeochemistry lab in the Department of Geological Sciences. Her research interest includes carbon burial and the processes that influence carbon burial, such as redox changes, carbon sources, and metal interactions.