

Seasonal dynamics of diagenetic processes in an intertidal temperate mudflat: the Mudsurv project

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Bay of Bourgneuf is a macrotidal mudflat located in France under the influence of the Loire plume. Intertidal mudflats are the site of important carbon sequestration through the activity of microphytobenthic communities. The Mudsurv project aims to understand the interactions between microphytobenthic communities, diagenetic processes driving nutrient regeneration and benthic foraminiferal assemblages in the long term. The survey started in March 2016 and has been running on a monthly basis for the first couple years, has been running quarterly since then. We aim to follow this mudflat at least for ten years to observe the local influence of climate change. Here, we present the first 18 months of geochemical results obtained from microprobe profiling and core processing. These results are contextualized with the normalized difference vegetation index (NDVI) that is a proxy of microphytobenthic biomass and allow us to well characterize seasonal changes in nutrient bioavailability, oxygen production and uptake as well as iron and manganese redox cycling and mobility. Diffusive oxygen uptake varied between 14 and 75 mmol m⁻² d⁻¹ while diffusive oxygen production maximum was about 450 mmol m⁻² d⁻¹. Porewater nitrate was almost always below limit detection while nitrite varied between 0 and 4 μmol L⁻¹ suggesting that there is very little nitrogen mitigation and almost all nitrogen as ammonium is internally recycled. There are very few data series of sedimentary geochemical profiles that exist and none at our knowledge in intertidal mudflats, despite the importance of such systems in relation to carbon sequestration and coastal anthropization issues. Our goal is to convince government agencies to integrate such studies in existing monitoring networks.