Lateral Carbon Flux from a Saltmarsh: Implications for Coastal Acidification and Carbon Budget

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Saltmarshes are biogeochemical hotspots storing carbon in sediments and in the ocean following lateral carbon export. This transfer of carbon and alkalinity from the land to the ocean represents an important process in the global carbon cycle. Here, we measure lateral carbon fluxes – import and export of carbon via tidal channels – in a saltmarsh in the Barataria Basin in Louisiana and evaluate the impact factors on lateral carbon fluxes. We hypothesized that porewater carbon export is an important process for blue carbon loss which contributes significantly to lateral carbon flux. To test this hypothesis, environmental parameters such as salinity, temperature, pH, dissolved oxygen, fluorescent dissolved organic matter, as well as carbon concentrations, including dissolved inorganic carbon (DIC), dissolved organic carbon (DOC), and total alkalinity (TA) concentrations were measured since 2021 for lateral carbon flux calculations. Radon concentrations were measured continuously for over 24 hours during five field trips to evaluate porewater carbon export. Our preliminary results showed that porewater carbon exports contributed significantly to lateral carbon fluxes. Lateral carbon fluxes mirrored the water flux pattern, and positive (ebb-directed) lateral carbon fluxes were mostly driven by higher carbon concentrations during ebb flow associated with porewater drainage versus flood flow. Lateral flux of DIC was generally higher than TA flux, which has significant implications for coastal acidification and carbon budget. This exported TA represents a long-term carbon sink in the ocean while the ratio of TA/DIC impacts the carbonate chemistry of coastal waters.