

Seasonal Variabilities in Sources and Transport of Dissolved Organic Carbon from a Rapidly Eroding Coastal Estuary in Mississippi River Delta Plain

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The fate of soil organic carbon loss from eroding coastal wetlands is an important and unaccounted component of the global carbon cycle. A large fraction of this soil organic carbon upon erosion is released as dissolved organic and inorganic carbon (DOC and DIC) to adjacent water bodies while the rest is lost to atmosphere as CO₂. In this study, we investigate the seasonal concentrations and transport of DOC in Barataria Basin in Louisiana, USA, bordering northern Gulf of Mexico (nGOM). This basin is currently undergoing one of the highest land-loss rates in the US. Seasonal measurements of DOC, DIC and colored dissolved organic matter (CDOM) were carried out during winter, spring, summer, and fall of 2020-2021. The average DOC in the Barataria Basin varied between 7.78 mg/l in winter and 10.41 mg/l in spring, whereas the average DIC varied between 2582.47 uM in fall, and 1553.26 uM in winter. Humification index and statistical analysis suggests a strong influence of terrigenous organic matter input in the northern part of the bay. The seamless creek-to-ocean SCHISM 3D model validated by data from the east coast and the coast of GOM was implemented in this study to compute the discharge rate at the Barataria Pass followed by assessing the seasonal DOC transport. The DOC export was highest in spring, estimated at 2.01×10^{11} mg/day and translated to approximately 4.3×10^{13} mg on an annual basis. This study highlights the importance of DOC export from small estuaries, which should be incorporated in ocean carbon budget on a global scale.