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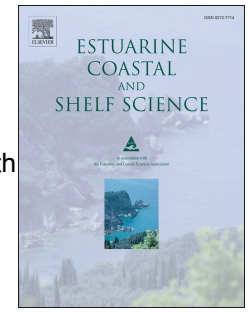

Assessing dissolved carbon transport and transformation along an estuarine river with stable isotope analyses

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Assessing dissolved carbon transport and transformation along an estuarine river with stable isotope analyses

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Abstract

Estuaries play an important role in the dynamics of dissolved carbon from rivers to coastal oceans. However, our knowledge of dissolved carbon transport and transformation in mixing zones of the world's coastal rivers is still limited. This study aims to determine how dissolved inorganic carbon (DIC) and dissolved organic carbon (DOC) concentrations and stable isotopes ($\delta^{13}C_{DIC}$ and $\delta^{13}C_{DOC}$) change along an 88-km long estuarine river, the Calcasieu River, Louisiana, with salinity ranging from 0.02 to 21.92. The study is expected to elucidate which processes most likely control carbon dynamics in a freshwater-saltwater mixing system, and to evaluate the net metabolism of this estuary. Between May 2015 and February 2016, water samples were collected and in-situ measurements on ambient water conditions were performed during five field trips at six sites from upstream to downstream of the Calcasieu River, which enters the Northern Gulf of Mexico (NGOM) in the southern United States. The DIC concentration and $\delta^{13}C_{DIC}$ increased rapidly with increasing salinity in the mixing zone. The average DIC concentration and $\delta^{13}C_{DIC}$ at the site closest to the NGOM (site 6) were 1.31 mM and -6.34‰, much higher than those at the site furthest upstream (site 1, 0.42 mM and -20.83‰).