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TITLE: Dynamics of sediment carbon stocks across intertidal wetland habitats of Moreton Bay, Australia

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ABSTRACT:

Abstract Coastal wetlands are known for high carbon storage within their sediments, but our understanding of the variation in carbon storage among intertidal habitats, particularly over geomorphological settings and along elevation gradients, is limited. Here, we collected 352 cores from 18 sites across Moreton Bay, Australia. We assessed variation in sediment organic carbon (OC) stocks among different geomorphological settings (wetlands within riverine settings along with those with reduced riverine influence located on tide?dominated sand islands), across elevation gradients, with distance from shore and among habitat and vegetation types. We used mid?infrared (MIR) spectroscopy combined with analytical data and partial least squares regression to quantify the carbon content of ~2500 sediment samples and provide fine?scale spatial coverage of sediment OC stocks to 150 cm depth. We found sites in river deltas had larger OC stocks (175?504 Mg/ha) than those in nonriverine settings (44?271 Mg/ha). Variation in OC stocks among nonriverine sites was high in comparison with riverine and mixed geomorphic settings, with sites closer to riverine outflow from the east and south of Moreton Bay having higher stocks than those located on the sand islands in the northwest of the bay. Sediment OC stocks increased with elevation within nonriverine settings, but not in riverine geomorphic settings. Sediment OC stocks did not differ between mangrove and saltmarsh habitats. OC stocks did, however, differ between dominant species across the research area and within geomorphic settings. At the landscape scale, the coastal wetlands of the South East Queensland catchments (17,792 ha) are comprised of approximately 4,100,000?5,200,000 Mg of sediment OC . Comparatively high variation in OC storage between riverine and nonriverine geomorphic settings indicates that the availability of mineral sediments and terrestrial derived OC may exert a strong influence over OC storage potential across intertidal wetland systems.

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