Assessing organic carbon storage in seagrass-meadow sediments using grain size fractionation and isotopic analyses

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Coastal sediments play an important role as the major sink of organic carbon (OC), storing both marine biota-derived OC (i.e., blue carbon) and terrestrial-derived OC. Part of OC stored in the sediments is sequestered from atmospheric CO_2 for geological timescales. The OC burial rate is much higher in coastal ecosystems than the open ocean. The burial of biochemically recalcitrant OC and the physical protection of OC by sedimentary minerals are the suggested mechanisms of long-term OC preservation. In general, OC content is correlated with the specific surface area of sedimentary minerals in the open ocean; however, relationships between the characteristics of OC and sedimentary minerals in coastal systems are poorly understood. In this study, we sieved collected sediments to generate several size classes (>1000 μm, 250–1000 μm, 125–250 μm, 63–125 μm, 30–63 μm, and <30 μm), and analyzed mineral characteristics (specific surface area) and OC characteristics (OC content, ^{13}C, ^{14}C). Sediment cores were collected in seagrass meadows in the Furen Lagoon, the Hichirippu Lagoon (Hokkaido), and the Shiraho reef (Ishigaki Island), Japan. Silt and clay contents (<63 μm) in the sediment samples ranged from 4% to 62%. The specific surface area of the fractioned samples ranged from 0.84 to 22.90 $m^2\ g^{-1}$. We will present the results of the physical and chemical analyses to investigate relationships between the characteristics of both OC and sedimentary minerals of seagrass-meadow sediments in our poster.

Keywords: carbon storage, blue carbon, sediment, seagrass meadows, isotopic analyses, specific surface area

