

Assessing Coastal Blue Carbon Residence Times Using Radiocarbon Techniques

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Coastal Blue Carbon (CBC) is carbon stored in the ocean and surrounding ecosystem and includes seagrass beds, mangrove forests, and salt marshes. The quantification of this potential carbon sink presents an opportunity to boost funding towards Coastal Resilience projects by having coastal ecosystems enter carbon sustainability markets. These areas are often protected and maintained to ensure that the ecosystem services they provide, such as improved coastal resilience to storm surge and erosion, are conserved. It is well understood that CBC is an opportunity for the carbon sustainability market. However, the challenge lies in how to account for the carbon residence times in these dynamic ecosystems and to be able to assign a dollar amount to their sequestration services. We propose that by measuring the radiocarbon activities of the carbon entering, residing in, and exiting these systems, we can suggest a mean residence time for the sequestered carbon. These studies can also be used to help rehabilitate natural coastal ecosystems based on increasing carbon storage potential. Preliminary data from a case study conducted in South Florida will be presented, including our findings and an overall methodology for carbon residence time accounting. By collecting surface and pore water samples containing Dissolved Inorganic Carbon (DIC), Dissolved Organic Carbon (DOC), sediment (solid organic carbon), and gas (CO_2 and CH_4 , bulk and separated) and measuring their respective radiocarbon pools, a mass balance approach can be used to apply a mean residence time for carbon in these environments. The measurements from these research projects can be used to provide guidance on the monetary value of these ephemeral environments based on their ability to capture and store carbon. Furthermore, regular monitoring of the radiocarbon activities in these protected areas can help identify any changes to the local ecosystem and provide critical data needed to understand the extent and nature of any land-based disturbances, manmade or otherwise.