

P3.30**Carbon provenance and coastal connectivity -implications for temperate seagrass carbon sequestration capacity**

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Abstract

Seagrass has long been established as a coastal blue carbon habitat with near global presence. Their capacity to accumulate sedimentary organic carbon, poses them as a manageable resource to sequester carbon and reduce greenhouse gas emissions. Seagrasses accumulate carbon two-fold through *in situ* photosynthetic fixation of autochthonous carbon and sedimentation of allochthonous carbon from outside the ecosystem. This study collates an updated global synthesis of $\delta^{13}\text{C}$ analyses from seagrass sediments and leaves, enabling its categorisation into climatic regions alongside grouping by seagrass species size. For paired $\delta^{13}\text{C}$ seagrass sediment and leaf values there was a consistent difference in $\delta^{13}\text{C}$ of seagrass leaf tissue and seagrass sediment ($\Delta\delta^{13}\text{C}_{\text{seagrass-sediment}} \bar{x} = 7.31\text{‰}$, $\text{SD} \pm 3.69\text{‰}$), indicating regular presence of allochthonous carbon. The $\Delta\delta^{13}\text{C}_{\text{seagrass-sediment}}$ was significantly influenced by the regional climatic position of the meadow and highest in the temperate regions ($\bar{x} = 8.34 \text{ SD} \pm 3.44\text{‰}$). The morphology of the seagrass species inhabiting the meadows had an additive significant influence, with the lowest $\Delta\delta^{13}\text{C}_{\text{seagrass-sediment}}$ found in monospecific meadows dominated by large seagrass species (Temperate $\bar{x} = 5.76 \text{ SD} \pm 2.70\text{‰}$; Subtropic $\bar{x} = 4.18 \text{ SD} \pm 3.57\text{‰}$; Tropic $\bar{x} = 6.30 \text{ SD} \pm 3.67\text{‰}$). This suggests seagrass meadows associated climatic setting and subsequent placement within the coastal landscape influences their affinity for allochthonous carbon deposition, particularly in temperate regions. Large seagrass species' higher ratio of belowground biomass supports the accumulation of autochthonous carbon, however within the Northern temperate region there are a limited number of large seagrass species. This global review of seagrass meadows demonstrates that *placement within the seascape* and a meadow's *seagrass species composition* influences its carbon sequestration capacity; making them necessary forecasters of a meadow's carbon offset potential, particularly in the context of temperate seagrass meadows.

Keywords

Carbon sequestration, Seagrass meadows, Carbon provenance, Coastal connectivity