

Abstract

***The pervasive and evolving role of organic matter-mineral interactions
in the global carbon cycle***

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The fixation of carbon by photosynthetic organisms in terrestrial and aquatic realms and subsequent sequestration of this biospheric organic carbon in soils and sediments forms an integral component of the global carbon cycle, influencing atmospheric CO₂ and O₂ concentrations over a range of timescales. As part of this cycle, organic matter flows between carbon pools, from land to coastal waters, and from the continental margins to the ocean interior. Organic matter-mineral interactions play a critical role in storage and translocation processes, influencing the nature and balance of carbon that is respired, held in intermediate reservoirs (e.g., soils, river floodplains, estuaries and deltas) and stored long-term sedimentary sinks, and leading to lags between production and ultimate burial of carbon. Understanding organic matter-mineral interactions is thus of importance for constraining the dynamics of the carbon cycle and understanding its sensitivity to change. Radiocarbon measurements on organic matter, both at the bulk- and the molecular-level, can be used to explore carbon sources and dynamics on the continents and in the ocean. In this presentation, I will show examples that highlight the multiple pathways and timescales of carbon storage and transport, and that reflect intimate linkages between organic matter and minerals, and their influence on the workings of the carbon cycle – past, present and future.