# Coupled Iron-Organic Matter Dynamics in the Rhizosphere: Impacts on Soil Carbon Cycling

MARCO KEILUWEIT[1]

[1] School of Earth and Sustainability, University of Massachussetts, Amherst, MA-01003; keiluweit@umass.edu

Understanding the mechanisms governing soil carbon cycling is critical to predicting climate change impacts on the terrestrial carbon sink. Of particular importance for the fate of soil carbon are interactions of organic matter with iron. Reactions between organic compounds and reactive iron phases can both accelerate and retard carbon oxidation (and mineralization) rates, and thus represent key regulators of carbon storage in and $CO_2$ emissions from soils.

In many soils, both carbon and iron cycling is particularly active in "hotspots" created by plant roots and associated microbes. The release of root exudates, dead tissue, protons or oxygen cause dramatic spatial-temporal variations in ligand concentrations, pH and $E_h$ in rhizosphere soils. In these transient microenvironments, organic matter availability, iron solubility, and microbial activity are subject to constant change. Rapid interactions between iron phases and organic compounds, including (a)biotic reduction-oxidation reactions, sorption/desorption, and co-precipitation, are the consequence. Yet their cumulative impact on the fate of organic matter is poorly understood. This keynote will provide a broad overview of the importance of iron-organic matter interactions in rhizosphere microenvironments in controlling carbon cycling in soils.