

GRAND CHALLENGES GREAT SOLUTIONS

ASA, CSSA, & SSSA International Annual Meeting
Nov. 2-5, 2014 | Long Beach, CA

American Society of Agronomy | Crop Science Society of America | Soil Science Society of America

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54-6 The Role of Mineral Complexation and Metal Redox Coupling in Soil Carbon Cycling: Impacts of Climate Change.

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Monday, November 3, 2014: 9:50 AM

Long Beach Convention Center, Room 104A

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The association of carbon with mineral phases is a major stabilizing mechanism for protecting organic matter against microbial degradation in soils. Iron (Fe) oxides are of particular significance because of their abundance in soils and high reactive surface area. They are prone to redox variability along landscape gradients. We investigated C speciation and distribution and its association with other elements in soils from the Christina River Basin Critical Zone Observatory (CRB-CZO) using a combination of macroscopic and molecular scale techniques including synchrotron-based scanning transmission X-ray microscopy (STXM) and near edge X-ray absorption fine structure (NEXAFS) spectroscopy. Results showed a strong role of Ca and Fe in C-mineral association. Fe-oxide coatings were more important than aluminosilicates in promoting C-mineral associations. The major C forms associated with the soils were aromatic C, carboxylic C, and polysaccharides. The implications of climate change on C-mineral complexation e.g., effects of temperature, wetting and drying, weathering, microbial activity are not well understood, but will be discussed in the presentation.

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