GEOC: Division of Geochemistry

288 - Formation and reactivity of ferrihydrite-soil organic carbon-calcium ternary complexes

View Session Detail

Dinesh Adhikari[3], *Tyler Sowers*[2], *Jason Stuckey*[2], *Donald Sparks*[1], ***Yu Yang***[3], *yutou.one@gmail.com*

[1] Interdisciplinary Sci Engr Lab, Univ of Delaware, Newark, Delaware, United States; [2] Plant and Soil Sciences, University of Delaware, Newark, Delaware, United States; [3] University of Nevada, Reno, Reno, Nevada, United States

Abstract:
Complete understanding about the interactions between soil organic carbon (SOC) and minerals is important for predicting the stability of SOC and its response to climate change. Recent studies have shown the importance of calcium (Ca)-bearing minerals and iron (Fe) oxide in associating with and stabilizing SOC. In this study, we have investigated the formation and reactivity of ferrihydrite-SOC-Ca ternary complexes. During the co-precipitation of ferrihydrite with SOC in the presence of Ca^{2+}, 60% of SOC can be co-precipitated with ferrihydrite at a C/Fe (molar ratio) of up to 10, whereas the Ca/Fe ratio was saturated at 0.2. Increasing amount of Ca^{2+} did not affect the co-precipitation of SOC with ferrihydrite or the lability of ferrihydrite-bound SOC. In addition, microbial reduction of ferrihydrite and reductive release of ferrihydrite-bound SOC were not influenced by the presence of Ca. As a comparison, the presence of SOC increased the incorporation of Ca into the structure of ferrihydrite. Our results indicate the formation of ferrihydrite-SOC-Ca complexes, with organic carbon bridging the ferrihydrite and Ca. Such ternary complexes potentially play an important role in regulating the interactions between SOC and mineral phases in soil.