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435-1 Tender Energy X-Ray Absorption Spectroscopy for Determining Phosphorus Speciation in Soils.

Poster Number 1114

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Wednesday, November 5, 2014
Long Beach Convention Center, Exhibit Hall ABC

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A fundamental understanding of soil phosphorus (P) speciation is vital for evaluating P retention and transport in soils. Although the chemistry of P has been extensively studied, specific mechanisms for P adsorption to soils remain largely unclear. Current methods for soil P speciation rely heavily on sequential chemical extractions which are *ex situ* and can introduce artifacts during the analysis procedure. To overcome limitations of current methods for examining the P speciation, non-invasive spectroscopic techniques can be used to analyze soils *in situ*. This study will evaluate a novel synchrotron tender X-ray (i.e., 1-5 keV) microprobe at the updated National Synchrotron Light Source (NSLS-II) to elucidate mechanisms for P bonding in soils. This high resolution beamline has the capability to perform micro-scale X-ray fluorescence (XRF) imaging and X−ray absorption spectroscopy (XAS) at the P K-edge. The microprobe can collect P extended X-ray absorption fine structure spectroscopy (EXAFS) data to determine nearest-neighbor identity, bond distances, and coordination number for light elements such as P. The progress of the tender X-ray microprobe will be reported, including a P EXAFS study of organic P sorption on aluminum hydroxides and micro-focused XRF in P-rich agricultural soils. This research will expand knowledge of P retention in soils to facilitate the identification of management practices to mitigate loss of P to the environment.

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