



Visions for a Sustainable Planet

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165-1 The Role of a Multi-Scale and Multi-Tool Approach in Advancing the Frontiers of Soil Biogeochemistry.

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Monday, October 22, 2012: 1:20 PM
Duke Energy Convention Center, Room 212, Level 2



Donald Sparks, University of Delaware, Newark, DE

The use of state-of-the-art, *in-situ* spectroscopic techniques has greatly advanced our understanding of biogeochemical reactivity and speciation of contaminants in natural, heterogeneous systems such as soils, sediments, and aquatic systems. These techniques enable one to make measurements at small spatial and rapid temporal scales and simulate natural environmental conditions. Undoubtedly, the molecular characterization of microenvironments and interfacial reactions will become increasingly significant in understanding the interactions between chemistry, physics, and biology in natural environments. There are a number of areas dealing with soil biogeochemistry where the application of molecular environmental science, which employs a multi-scale and multi-tool approach, is resulting in major frontiers. These include: speciation of contaminants; mechanisms of microbial transformations at mineral/metal(loid) interfaces; carbon-mineral complexation; mechanisms of trace metal interactions with humic substances; redox transformations; trace metal(loid) biochemistry at the plant/soil interface; development of predictive models; effective remediation and waste management strategies; and risk assessment. Examples of some of these research frontiers will be presented.

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