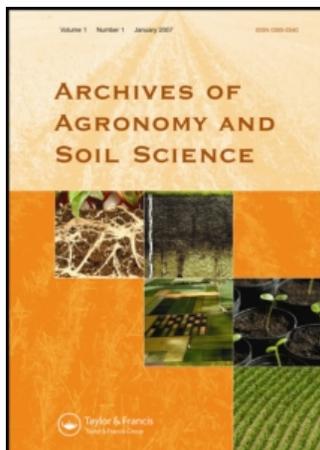


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### “Frontiers in Wetland Biogeochemistry”

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## PREFACE

### “Frontiers in Wetland Biogeochemistry”

Wetland ecosystems are hotspots of biogeochemical cycling in landscapes, a feature that is recognized worldwide in the form of policies and laws that attempt to protect wetlands against human degradation. Most of the functions that make wetlands valuable to people emerge from biogeochemical processes centered in soils. The wetland biogeochemistry community has been busy studying these processes in order to address a wide variety of human impacts on the environment, ranging from local pollution to regional fisheries to global climate change.

Many of our most pressing environmental issues are influenced by wetland soils. Wetland soils cleanse water polluted by sediments, nutrients and toxic waste. They support critical ecosystems for wildlife populations, including commercially important fish and shellfish. Wetland soils are sinks for carbon dioxide that would otherwise contribute to the greenhouse effect, and are simultaneously sources of greenhouse gases such as methane and nitrous oxide. Soils are the foundation of coastal and riverine wetland ecosystems that dissipate the destructive energy of storm surges and floods.

Recent years have witnessed a dramatic increase in our knowledge of wetland biogeochemistry and its contribution to element cycling at all spatial and temporal scales. Insights on microbial diversity have forced us to revisit the classical paradigms of microbial resource competition in wetland soils. We have been humbled to discover completely novel metabolic pathways of carbon and nitrogen transformations, two of the most widely studied element cycles. Remote sensing and new analysis tools have revealed spatial relationships between wetland ecosystems, agriculture, urban development and other land uses that govern regional- and global-scale environmental phenomena. Discoveries have come from combining traditional biogeochemical studies with novel molecular and landscape approaches, demonstrating the benefits of integration across disciplines. All of these recent advances have important implications for the management of natural and created wetland ecosystems.

The Wetland Biogeochemistry Symposium has a 20-year history of highlighting advances in this important field. The Smithsonian Environmental Research Center, USA, was honored to host the 10th gathering of this biennial symposium. Delegates traveled from 14 nations to Annapolis, Maryland, USA, to exchange knowledge, share ideas, and exercise their passion for Wetland Biogeochemistry.

The primary objective of the Symposium was to reflect on Frontiers in Wetland Biogeochemistry. Sessions were organized on recent advances in understanding novel pathways of anaerobic metabolism, methane oxidation, mercury and organic contaminant dynamics, chromophoric dissolved organic matter cycling, trace gas emissions, carbon sequestration and marsh responses to sea level rise. There were also sessions on nitrogen,

phosphorus and sulfur transformations in wetland soils. A few key points that emerged from the Symposium were:

- Our understanding of wetland soil microbial community diversity is primitive, both in terms of phylogeny and metabolic pathways;
- Processes that are dominant at the scale of microsites or individual marshes may be far less important at landscape or regional scales due to the emergence of important new processes;
- The influence of wetlands on estuaries and coastal oceans extends beyond their effects on nutrient dynamics to include effects on UV penetration, microbial metabolism, pH and alkalinity;
- Current knowledge of wetland biogeochemistry, although limited, is sufficient to guide wise management of wetlands ecosystems and the landscapes where they occur.

This issue includes a few of the many presentations at the Symposium. Abstracts from the full program are at <http://www.serc.si.edu/conference/index.jsp>. The 11th Symposium will be held from 21–27 June 2009 in a joint meeting with the Society of Wetland Scientists ([www.sws.org/](http://www.sws.org/)) in Madison, Wisconsin, USA.

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