A muddy matter: nutrient and carbon cycling in mucky sediments in wetlands and other shallow freshwater ecosystems

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PROJECT DESCRIPTION

Small, generally shallow aquatic ecosystems (ponds and wetlands) are abundant in many landscapes, and their roles in global biogeochemical cycles (e.g., carbon, nitrogen, and phosphorus) are increasingly appreciated. Unfortunately, the number of studies focused on small aquatic ecosystems has lagged behind those on larger lakes and reservoirs; thus, to make meaningful estimates of the importance of inland waters in global biogeochemical cycles, we need more studies that focus on biogeochemical processes in small water bodies.

Many processes that influence water quality, toxicity in sediments, and carbon cycling in freshwater ecosystems occur at the water-sediment interface, a chemically and biologically reactive zone. Research activities this summer will focus on the interaction between water and an understudied type of organic-rich sediment (think loose mud) that is common in water bodies throughout the region. As such, our primary goals this summer will be (1) to determine the drivers of surface water and ground water exchange with water in these sediments (porewater); and (2) explore how these interactions influence nutrient and carbon cycling. This project will be field-intensive, but will also involve lab work. The candidate must be comfortable working in both water and muck using small boats and waders. The REU will gain knowledge in limnology, chemistry, and ecosystem ecology.

I am eager to develop an independent project alongside an undergraduate that suits both of our interests. The student will have the flexibility to choose from a wide variety of research topics including, but not limited to, quantifying sediment decomposition and accretion in varying aquatic environments, measuring greenhouse gas emissions from sediment, the role of aquatic organisms in disturbing sediments, or anything relating to how carbon, nitrogen, phosphorus, iron, and sulfur are cycled in these sediments.