10-11-2021

INSIGHTS INTO GROUNDWATER FLOW PATHS IN AN INTENSIVELY MANAGED CRITICAL ZONE IN NEBRASKA

Kelly M. Deuerling
University of Nebraska at Omaha, kdeuerling@unomaha.edu

Ashlee L.D. Dere
University of Nebraska at Omaha, adere@unomaha.edu

Andrew Miller
University of Nebraska at Omaha, andrewmiller@unomaha.edu

Lee A. Miller
Burke High School, Omaha Public Schools

GSA Connects 2021 in Portland, Oregon

Paper No. 119-11
Presentation Time: 2:30 PM-6:30 PM

INSIGHTS INTO GROUNDWATER FLOW PATHS IN AN INTENSIVELY MANAGED CRITICAL ZONE IN NEBRASKA

DEUERLING, Kelly, Department of Natural & Applied Sciences, University of Wisconsin Green Bay, 2420 Nicolet Dr, UW Green Bay, Green Bay, WI 54311, DERE, Ashlee, UNODepartment of Geography/Geology, 6001 Dodge St, Omaha, NE 68182-1102, MILLER, Andrew, Department of Chemistry, University of Nebraska at Omaha, 6001 Dodge Street, Omaha, NE 68182 and STOVER, Lee A., Burke High School Science Dept, Omaha Public Schools, 12200 Burke Blvd, Omaha, NE 68154

Glacier Creek, a groundwater-fed stream located in Glacier Creek Preserve (GCP) near Omaha, Nebraska, flows through restored tallgrass prairie and agricultural land (corn-soy rotation) draining a 4 km^2 area. The 1 km wide watershed developed on Peoria Loess that overlies Sangamon age glacial till; Glacier Creek itself flows through the glacial till. Previous work concerning land use impacts on solute fluxes indicated a distinct distribution and flux of solutes through restored prairie and agricultural land. Inputs into the subsurface on agricultural land are slow and more concentrated but are diluted by precipitation along shallow flow paths to the north fork of Glacier Creek. In contrast, subsurface flow paths through the restored prairie are more rapid and deeper, leading to less concentrated water in the south fork of Glacier Creek. However, little is known about the subsurface stratigraphy and hydrogeology of the groundwater that provides year-round flow into Glacier Creek. Here we present the initial interpretation of a series of sediment cores and aquifer tests from the ridgetop, midslope, and foot slope topographic positions of agriculture and restored prairie. Sediment cores from the southern, restored prairie portion of GCP show loess overlying glacial till (identified by the appearance of gravel-sized rock fragments). The stratigraphy of the northern, agricultural portion of GCP is much more complex: while loess does overlie glacial till, there are also a series of sandy outwash deposits that cannot be correlated across the landscape. Under both land uses, the local groundwater table lies within the glacial till as referenced by water depth measurements in monitoring wells and gleyed sediments present in cores. Slug tests conducted in ridgetop and foot slope wells indicate that the saturated hydraulic conductivity of the sediments underlying the agricultural land range from two-fold to an order of magnitude greater than those underlying restored prairie, consistent with the presence of sandy layers that conduct water at a quicker rate. Furthermore, the higher flow rates explain why the north fork of Glacier Creek (draining agriculture) produces more water despite being a smaller portion of the watershed. Given these new findings, we modify our conceptual model of subsurface flow at GCP.

Session No. 119--Booth# 28

D11. The Role of Chemistry, Climate, and Geology in Controlling Subsurface Structure and Flow (Posters)
Monday, 11 October 2021: 2:30 PM-6:30 PM

Exhibit Hall A (Oregon Convention Center)

Geological Society of America *Abstracts with Programs.* Vol 53, No. 6
doi: 10.1130/abs/2021AM-369563

Back to: D11. The Role of Chemistry, Climate, and Geology in Controlling Subsurface Structure and Flow (Posters)

<< Previous Abstract | Next Abstract >>