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Presentation Title: USE OF FLUORESCEIN DYE FOR CHARACTERIZING HYDROLOGIC FLUXES AT THE GROUNDWATER - SURFACE WATER INTERFACE

Abstract (250 words, maximum):

Groundwater-surface water interaction is of particular interest in the realm of water quality, as much of the groundwater contamination in the United States is present in shallow aquifers that are connected to surface water bodies. Determining the discharge at the groundwater – surface water interfaces remains a challenge due to sediment heterogeneities and integrating measurements at various spatial and temporal scales. In this study, mini-piezometers are first used to identify areas of groundwater discharge in lakes and streams, and a micro-pulse of fluorescein dye is released as a semi-conservative tracer to measure shallow groundwater fluxes and velocities at various transport length scales. The semi-permanent installation of “SedPoints” (MHEproducts.com), which are constructed of 1/4” polyethylene tubing, fitted with a polypropylene screen, and inserted to a known depth using a hollow stainless-steel installation tool to straighten the tubing, allow for tracer release from the same precise location for breakthrough reproducibility when (1) hydraulic gradients remain constant, and (2) seasonal variability causes hydraulic gradients to change. Preliminary results obtained in a lake and a stream at Spring Valley Park in Kalamazoo, Michigan indicate strong nearshore discharge patterns characterized by positive hydraulic head values. Initial dye tracer data in the lake has yielded consistent breakthrough times when fluorescein is injected to shallow depths and discharge velocities have been consistent at this particular location. This data suggests that breakthrough times using this method are reproducible, allowing for accurate quantification of groundwater discharge rates, especially compared to other methods where surface water flow effects may cause error.