



WATER RESOURCES FACULTY CANDIDATE SEMINAR

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Inferring Changes in the Local Hydrologic Balance: Integrated Modeling of Flow, Transport and Residence Time in a Pine Beetle Impacted Watershed.

Resident time distributions (RTDs) in hydrologic systems are powerful tools for identifying and understanding changes in the hydrologic balance. The amount of time that water spends in the surface water, vadose zone, and groundwater systems of a given watershed has large implications for the quality of the water and the sustainability of the water resources. Traditionally, the RTD is constructed from time-series of observed tracer concentrations or the distributions are modeled, but each of these approaches has limitations that make it difficult to reliably estimate RTDs from data collected in natural systems. This study evaluates whether new methods for identifying RTDs can be used to infer shifts in the hydrologic balance induced by extreme changes to the annual precipitation input to a high-mountain watershed in Colorado. The approach uses high-resolution integrated hydrologic models of the groundwater, vadose zone, and surface water systems, combined with numerical particle tracking, to simulate residence time and tracer concentrations in a highly heterogeneous domain based on the East Inlet watershed in Rocky Mountain National Park. The models show that a moderate change in precipitation has non-linear effects on streamflow, groundwater levels, and residence time. The methods for estimating RTDs are tested using the synthetic tracer data and we show that the new methods provide better estimates of residence time in complex systems, which can then be used to approximate transport through the integrated hydrologic system.

Date: Wednesday, March 12, 2014

Place: Thompson 24

Time: 3:00 p.m. — 4:00p.m.