BayCEER Kolloquium

Lectures in Ecology and Environmental Research

winter 2026/27

UNIVERSITÄT BAYREUTH

Donnerstag/Thursday
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12:30 in H6, GEO



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From Mountains to Cities: Simulating stream chemistry to trace flow paths and solute sources across landscapes

Forget divining rods and crystal balls; if you want to know the inner workings of a watershed, ask the stream. Streamflow acts as a hydro-biogeochemical oracle, carrying stories of the hidden and hard to measure processes that transform precipitation into river chemistry. But much like an oracle, a stream's story can be ambiguous. Landscape structure, hydrology, and biogeochemical processes all jointly shape water quality, making their relative importance notoriously hard to disentangle. In this talk, I will show how combining field observations with watershed-scale reactive transport modelling helps untangle the hydro-biogeochemical processes controlling stream chemistry. First, mountain catchments are examined to determine how vegetation, vertical and spatial solute distribution, and hydrologic connectivity govern the magnitude and timing of stream carbon signals. This framework is then extended to urban catchments, where stormwater networks and impervious surfaces disrupt flow paths and introduce overlapping chemical signals that obscure source inputs. In this work, stable carbon isotopes are coupled with RTMs to separate overlapping sources and flow paths. Ultimately, this work demonstrates that pairing targeted field data with process-based RTMs offers a powerful way to dig into complex water quality questions as climate and land-use change accelerate.







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