



UFZ-Seminar

Research Unit



Water Resources and Environment



21 June 2021, 3 p.m.

Seminar Room 1, Brückstr. 3a, Magdeburg

Wil Wollheim

Associate Professor, Department of Natural Resources and the Environment, University of New Hampshire, USA

will give a talk on:

Scaling cumulative function of aquatic networks

Watersheds have often been compared to unique individuals – every watershed is different from the next. Ecologists have long noted very consistent patterns in how the metabolism of individual organisms changes with increasing size of the individual, which is summarized as the Metabolic Theory of Ecology (MTE). We explored whether similar sorts of patterns emerged for aquatic functions like metabolism or denitrification with increasing watershed size. We used a river network model to show that the scaling relationship of cumulative function with increasing watershed size (log-log) tends to be superlinear for nutrients with low reactivity or at high flow conditions (when network supply > demand) but becomes increasingly linear for nutrients with high reactivity or under low flow (when network demand > supply). These emergent properties are difficult to test with observations since cumulative network function is so widely distributed from headwaters to large rivers, considerable heterogeneity, and high connectivity both within and among aquatic ecosystem types. Synoptic deployment of continuously monitoring sensors offers a potential approach for better constraining broad scale estimates of aquatic function through better estimates of inputs from the landscape, process rates within varied water bodies, and whole network exports.