



Opportunities from hydrology for stream microbial ecology and biogeochemistry

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Streams and rivers are increasingly recognized as global integrators of biogeochemical fluxes and of ecosystems that are often thousands of kilometers apart. The complex interplay of physical, chemical and biological processes across spatial scales makes these ecosystems globally so important despite their minor contribution to the Earth surface area. In this presentation, I will discuss how geophysical opportunities and microbial capacities may impact the performance of fluvial systems — from the microbial cell to ecosystems. For instance, flow patterns at the micrometer-scale may affect the spatial distribution of primary cells during early biofilm formation, whereas, at the millimeter-scale, biofilm topography and related flow patterns affect colonization of native biofilms by propagules. Next, at the centimeter- and meter-scale, the spatial heterogeneity of local flow patterns above bedforms shapes the bacterial biodiversity in biofilms and their performance to degrade organic carbon molecules in the streamwater. Finally, I will suggest how geophysical opportunities may affect biogeochemical fluxes at the level of river-floodplain systems and of fluvial networks. These examples should illustrate the potential of multidisciplinary efforts to advance aquatic sciences in a changing world.