New Approaches to Model Connectivity Along River Corridors

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Rivers are the Earth’s plumbing system -- they convey water, solutes, energy, and living organisms from the landscape, subsurface, and atmosphere to the oceans. Over the past three decades, our understanding of drivers and processes controlling transport, accumulation, and transformations along river corridors has significantly matured. It is clear now that “rivers are not pipes,” and that many of the key reactions controlling water quality take place in exchange zones (hyporheic zones, floodplain areas, and ponded waters) where riverine water is in close contact with geochemically and microbially-active sediments. This talk presents a view of the past, present, and future of river corridor science. First, we summarize some of the fundamental observations and theories that became pillars of our understanding of riverine transport (the past). Second, we highlight some of the new and exciting observational and modeling tools and theories that make possible the detailed description of riverine exchange processes at the local (millimeters), intermediate (meters to a few kilometers), and basin and regional scales. Finally, we discuss new challenges and opportunities for enhanced collaboration across the freshwater to marine continuum. This research is a product of the John Wesley Powell Center River Corridor Working Group https://powellcenter.usgs.gov/view-project