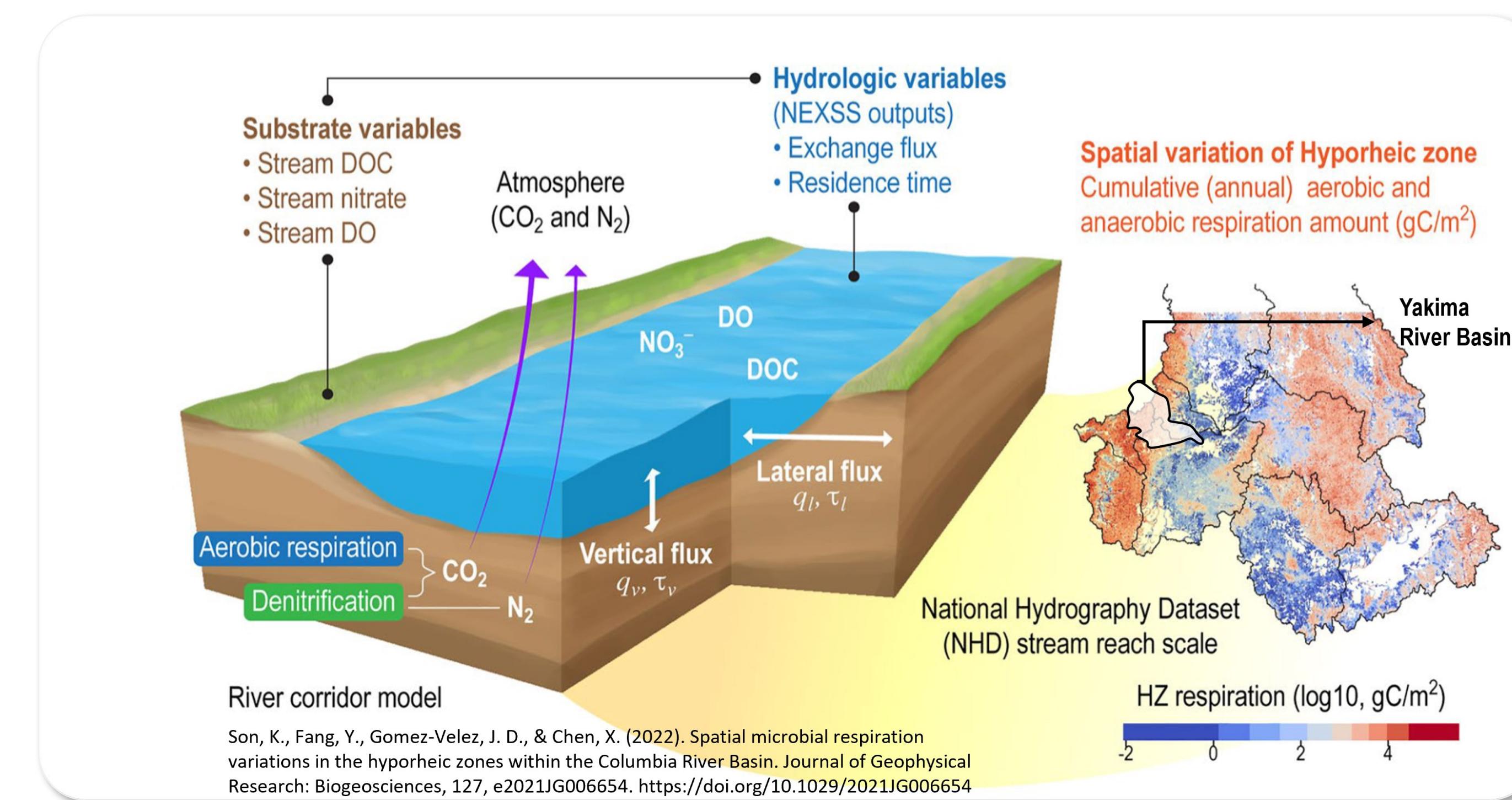


Designing Better Watershed Science for “Future Us”: An ICON-ModEx approach

Francisco J. Guerrero, Kyonho Son, Xingyuan Chen, Stephanie G Fulton, Amy E Goldman, Peishi Jiang, Matthew Kaufman, Timothy D Scheibe, and James Stegen

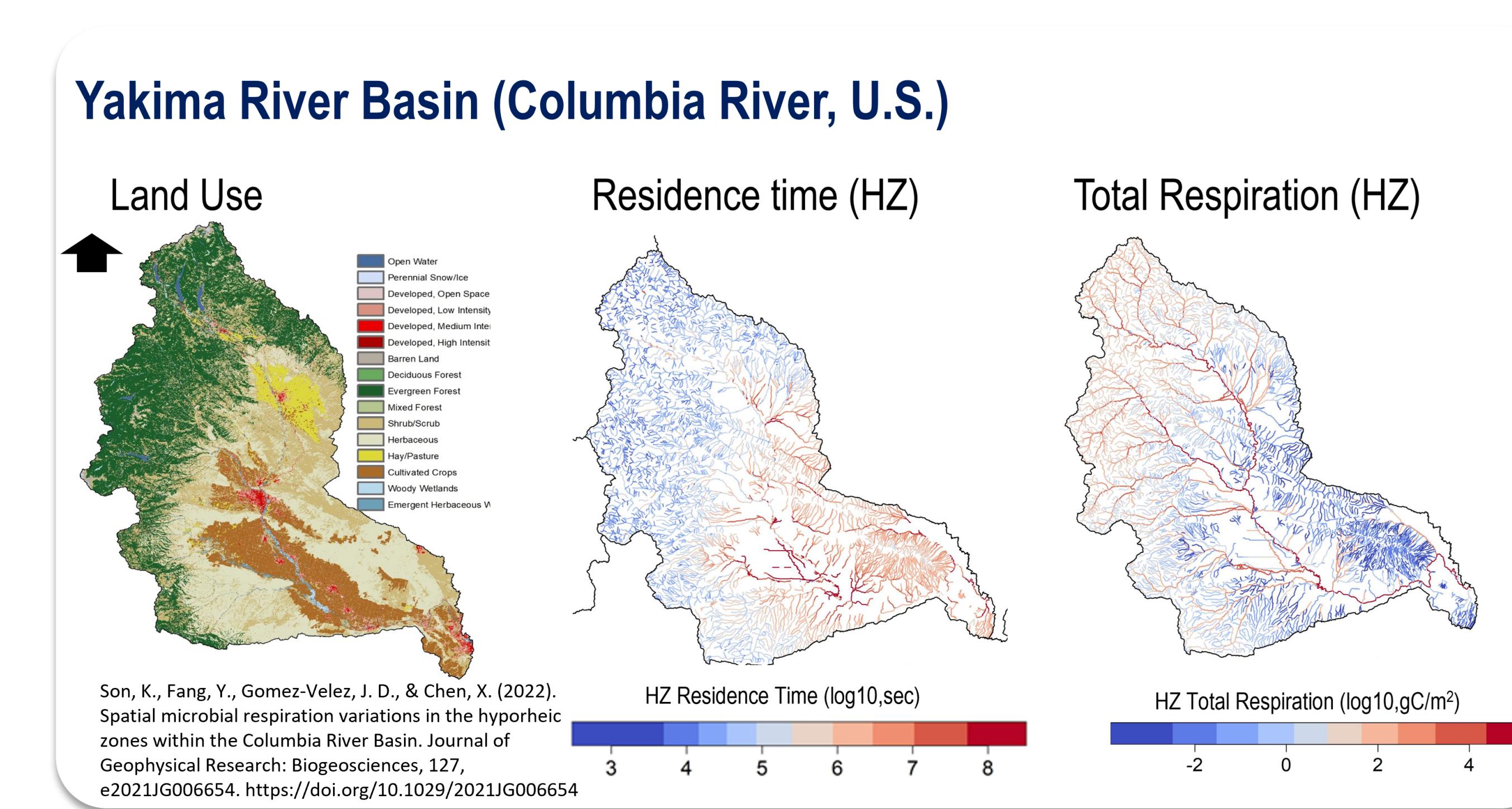
Key findings: The potential control exerted by hyporheic residence time at the reach scale and landscape heterogeneity on cumulative watershed biogeochemical function calls for a continuous model improvements and integrated, coordinated, networking, and open research design.)

River Corridor Model: Conceptualization



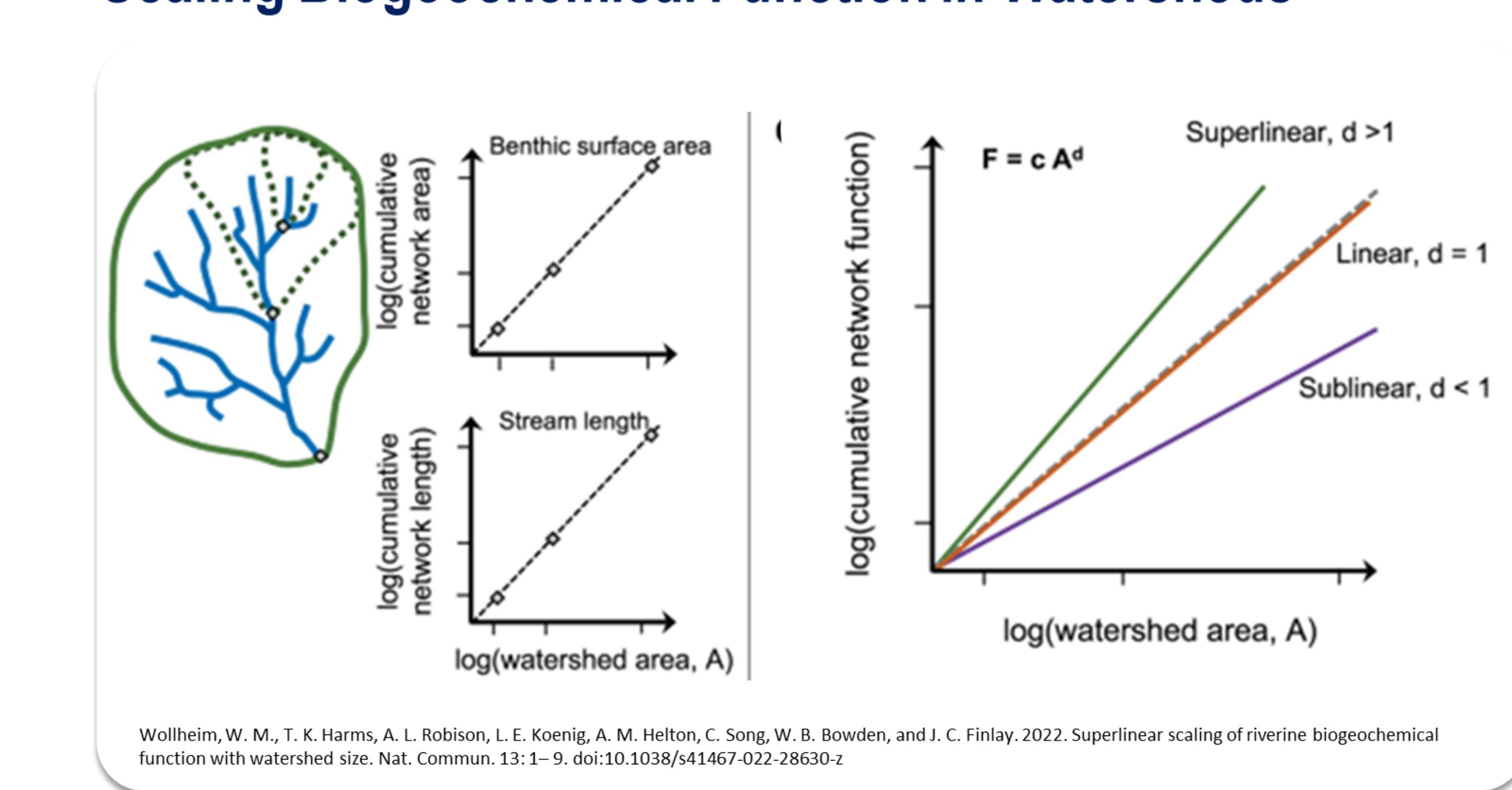
We use our River Corridor Model (RCM) as virtual reality scenario to explore scaling relationships between watershed area and Hyporheic Zone (HZ) respiration.

Landscapes and Hydro-biogeochemistry



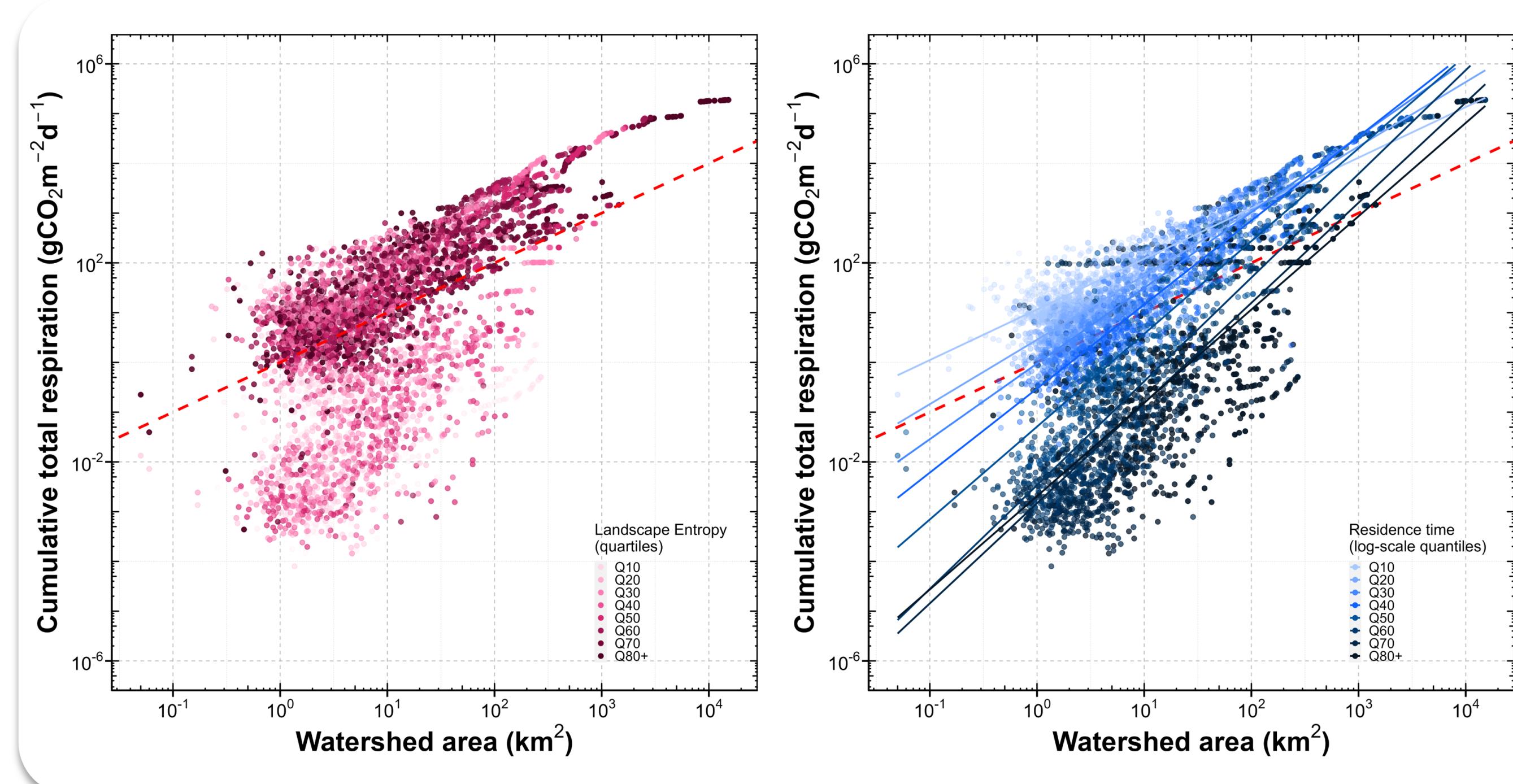
Our recent findings suggest that hyporheic exchange flux controls most of the spatial variability of HZ respiration, dominating over residence time and land use related variables.

Scaling Biogeochemical Function in Watersheds



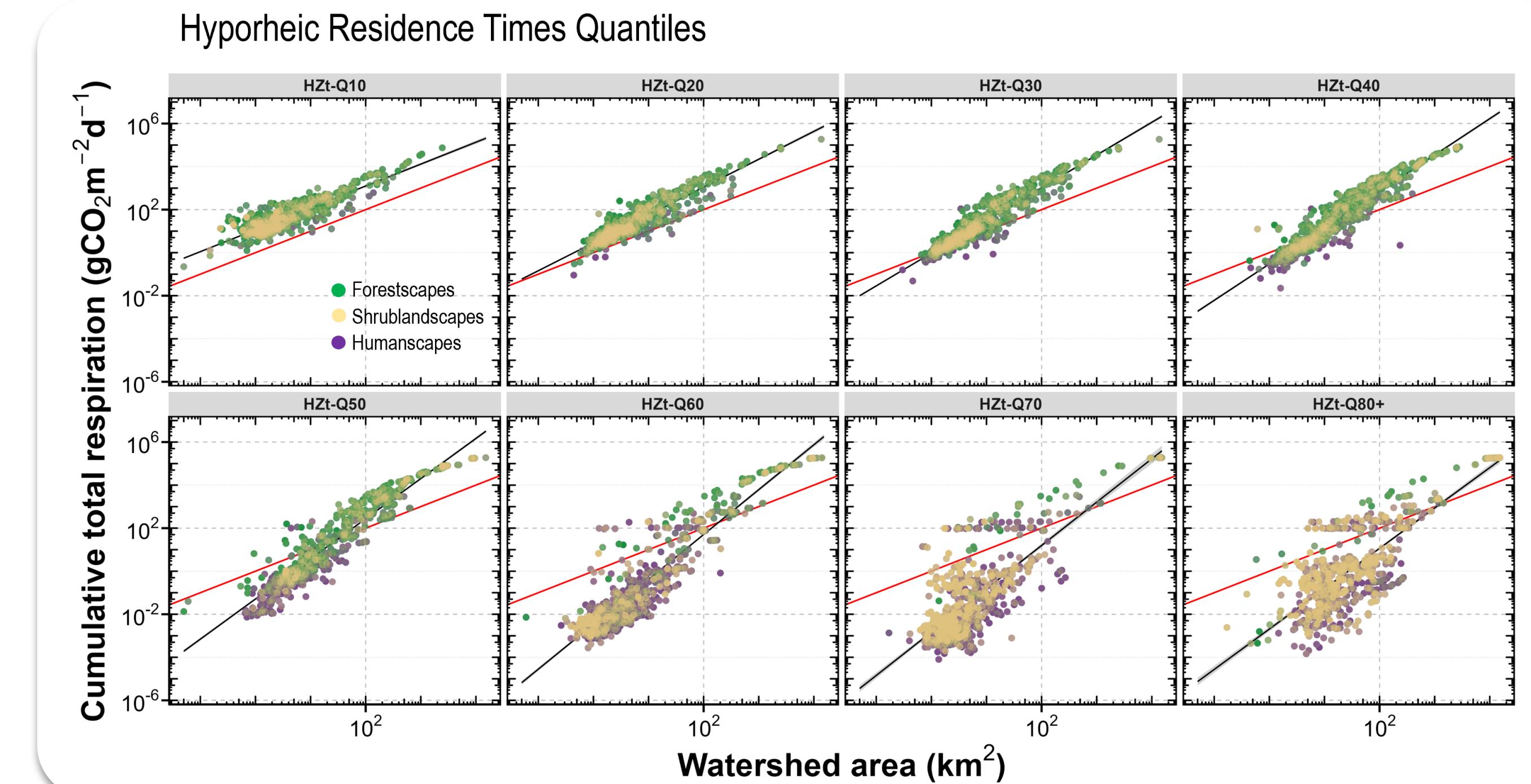
Wollheim et al., 2022 found that cumulative river metabolism increases faster than expected from the size of a watershed (i.e., super linear scaling).

Multiple scaling behavior across the Yakima River Basin



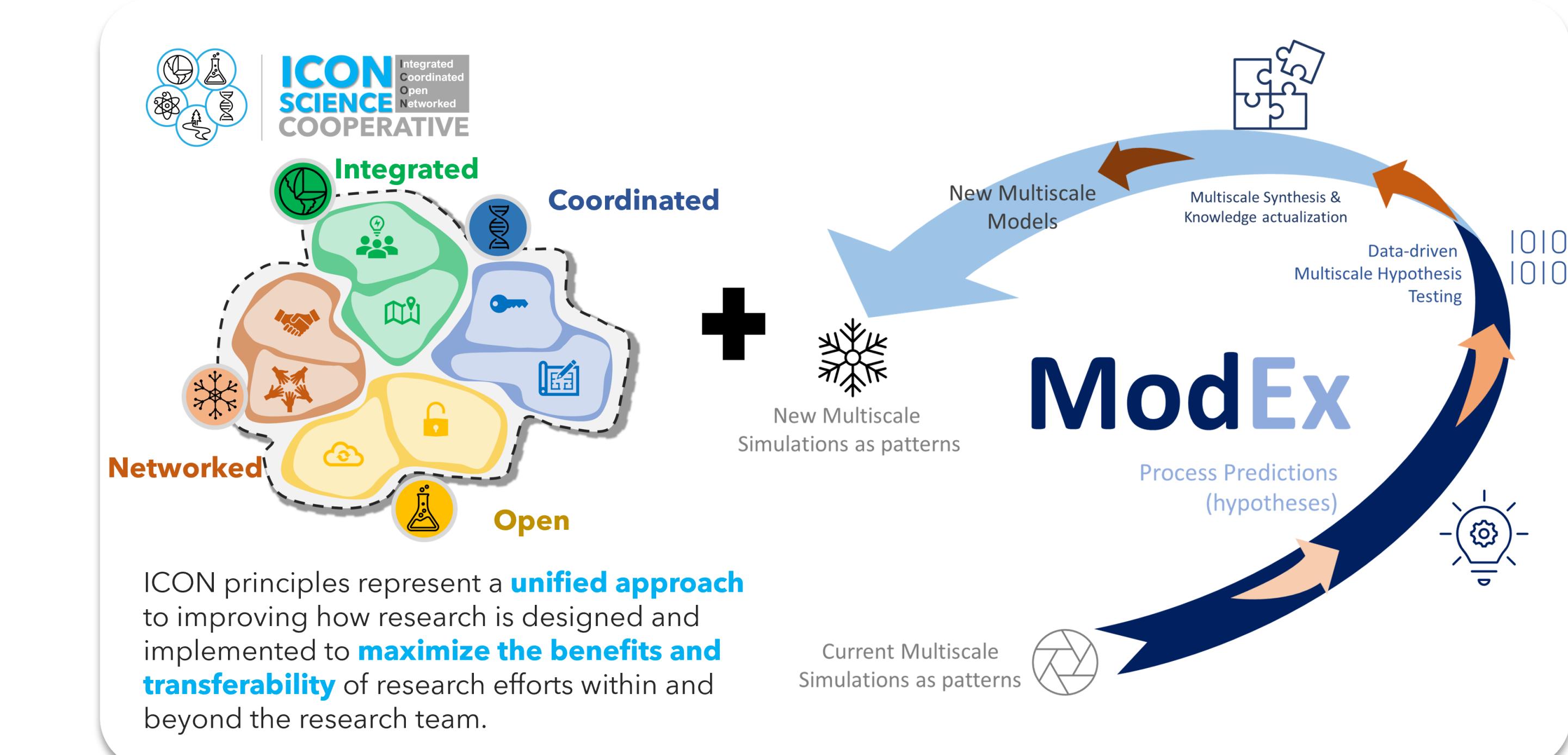
Scaling relationships in more homogeneous landscapes (low Shannon's entropy), with longer residence times tend to be super linear across the YRB.

Uncertain scaling behavior across “Humanscapes” in YRB



Yet, the scaling behavior becomes more uncertain as the frequency of stream segments running through “Humanscapes” (i.e., agriculture, pastures, cities) increases.

ICON-ModEx approach to Data-Model Integration



We want to understand how patterns emerge from multiscale models and how these patterns match observations from new locations.

We acknowledge the Yakama Nation as owners and caretakers of the lands where we collected the data used in this project. We thank the Confederated Tribes and Bands of the Yakama Nation Tribal Council and Yakama Nation Fisheries for working with us to facilitate sample collection and optimization of data usage according to their values and worldview.