

# Informing global river CO<sub>2</sub> models with SWOT

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# River network GHG evasion

**River networks evade substantial amounts of greenhouse gases (GHGs)** [e.g. Liu et al. 2022;

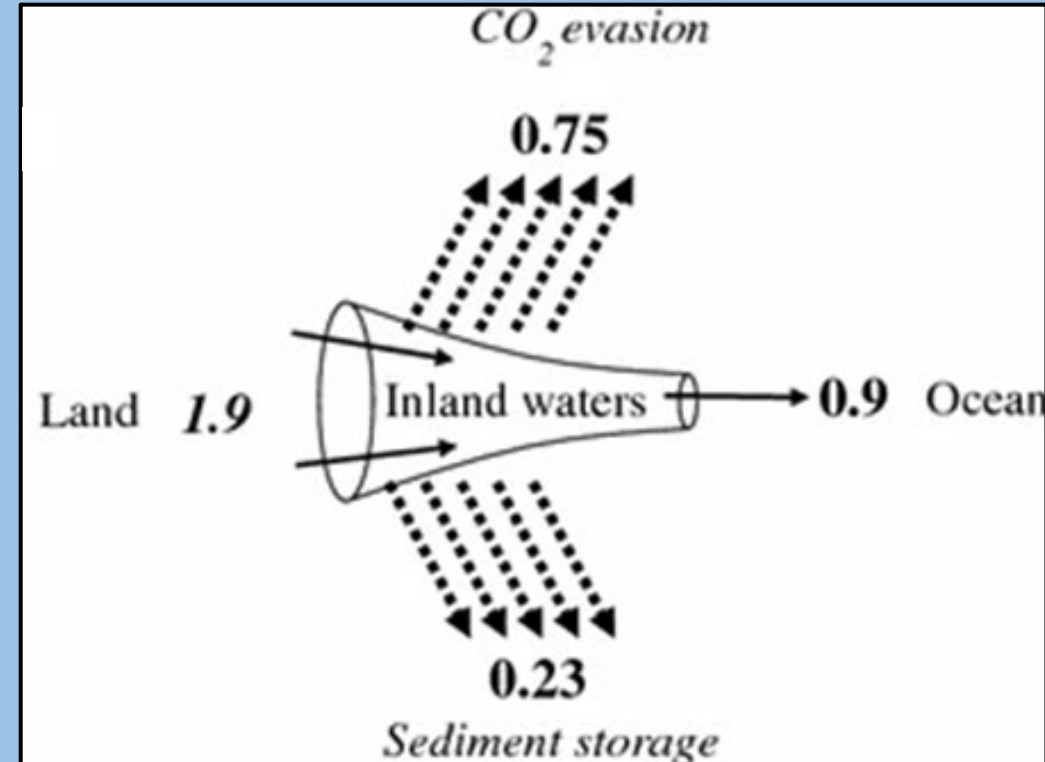
Horgby et al. 2019; Maavara et al. 2019; Raymond et al., 2013]

**Evasion is a function of both biogeochemical/hydrological processes** [e.g.

Marx et al. 2017; Raymond et al. 2016; Saccardi & Winnick 2021]

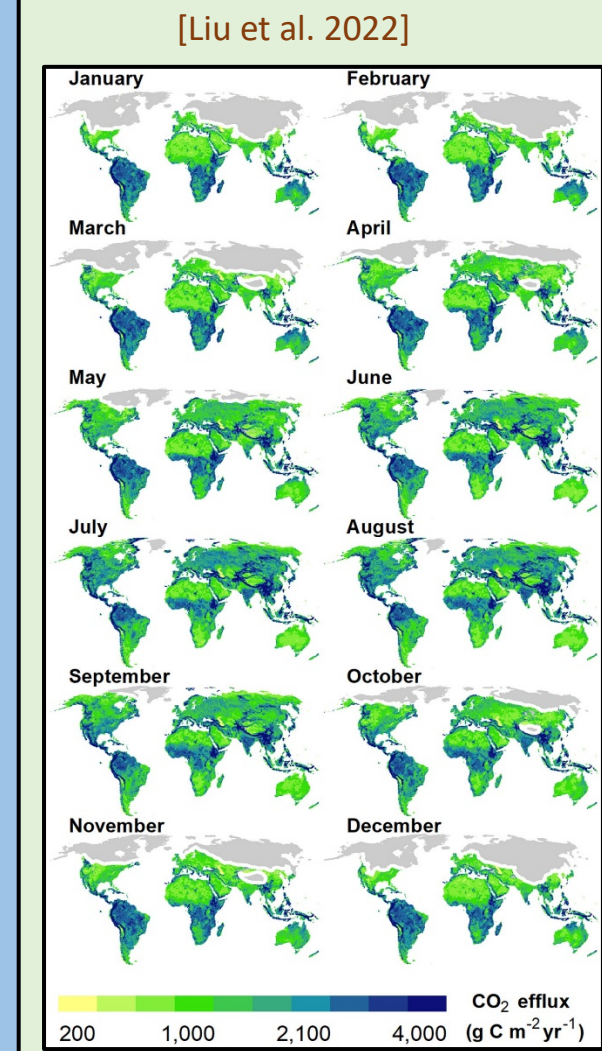
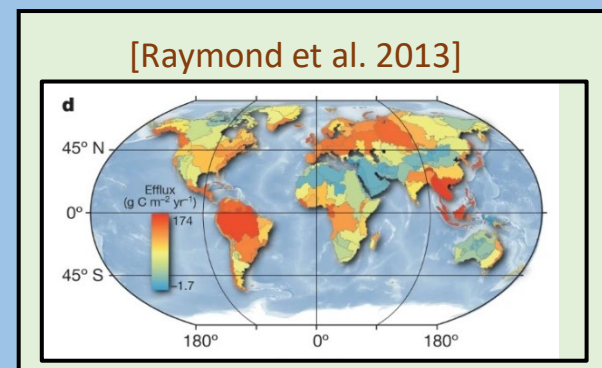
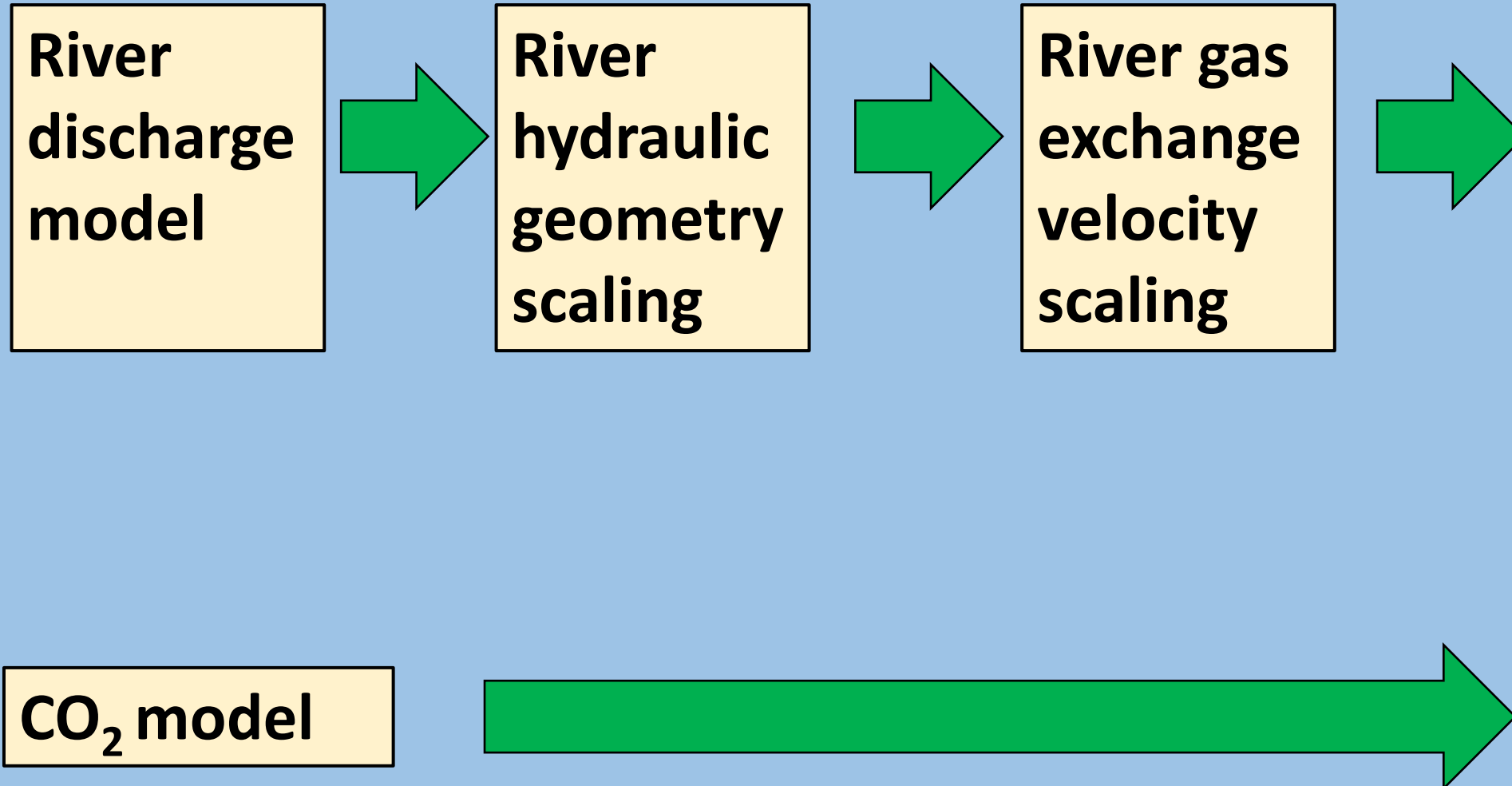
**and geomorphic/hydraulic processes** [e.g. Ulseth

et al. 2019; Raymond et al. 2012; Brinkerhoff et al. 2021]



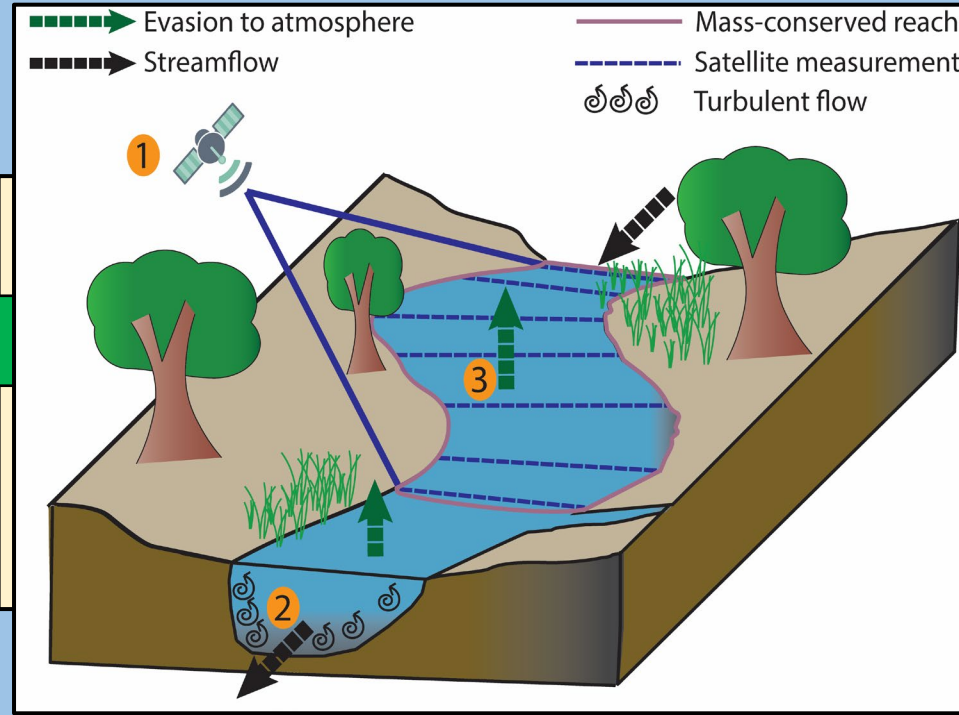
[Cole et al. 2007]

# How are global river emissions usually modeled?



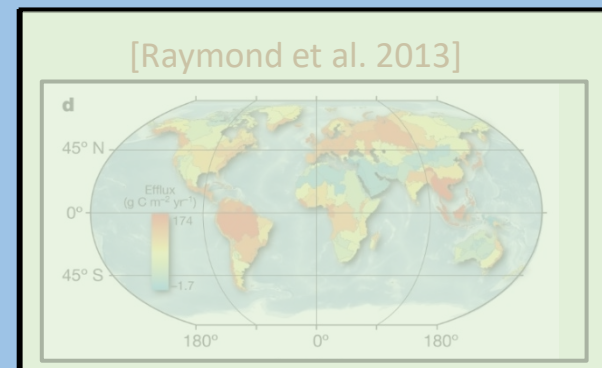
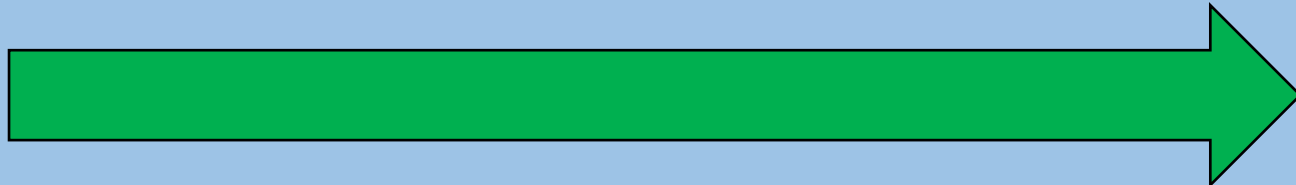
# How are global river emissions usually modeled?

SWOT data



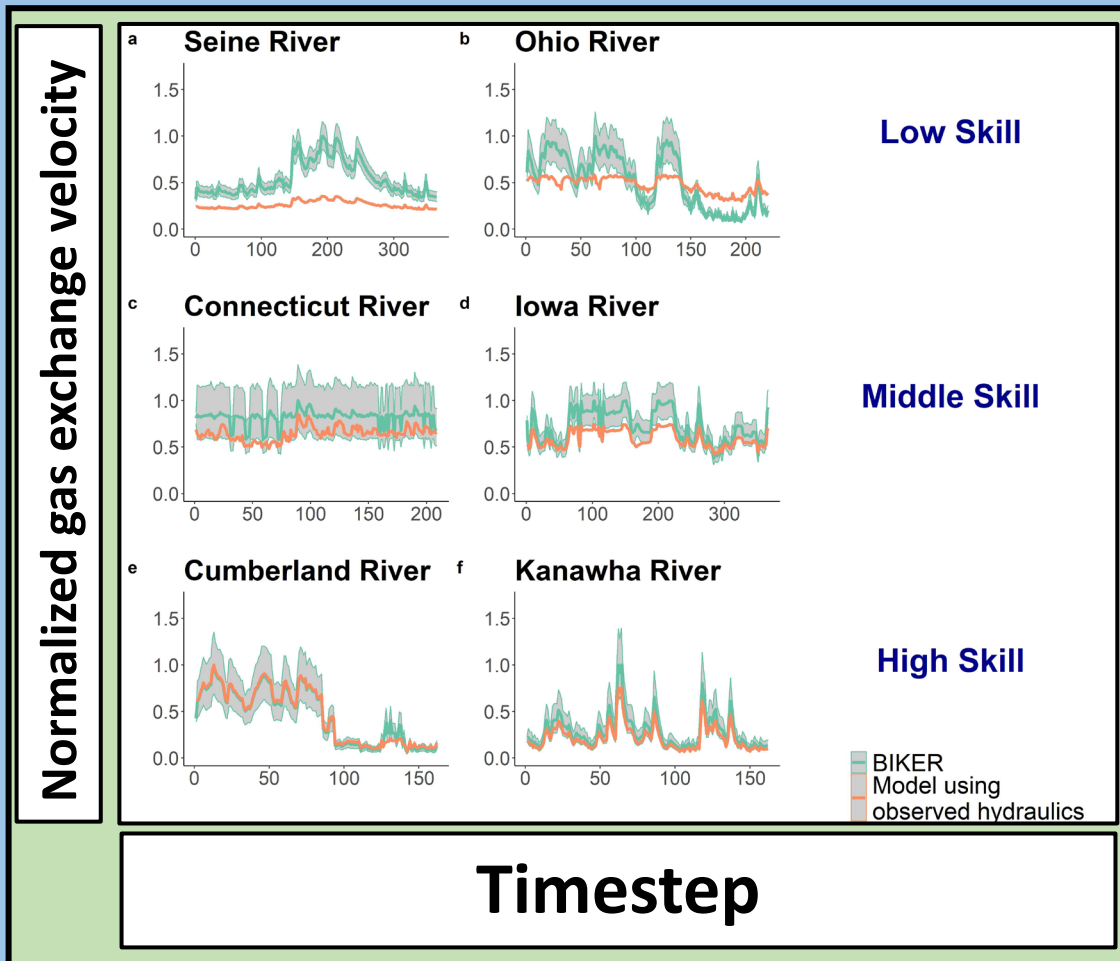
S

CO<sub>2</sub> model

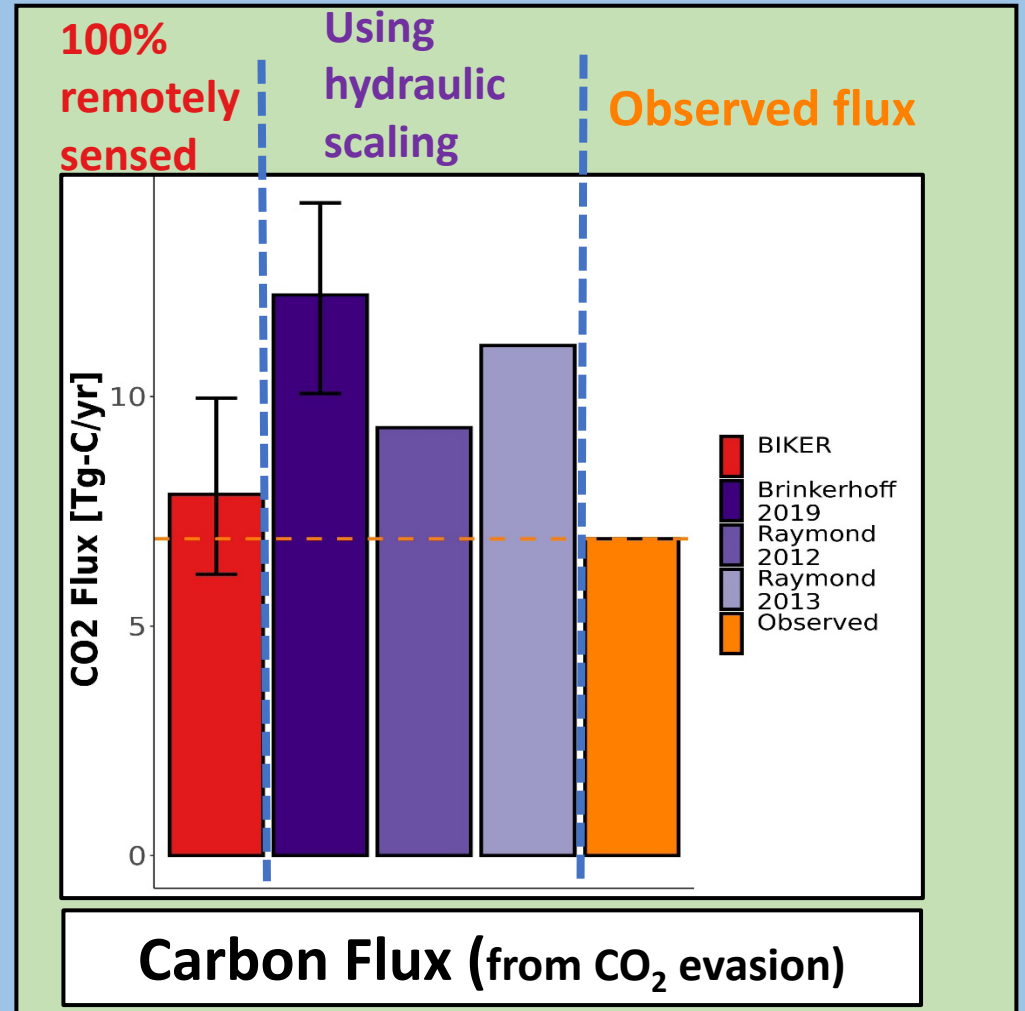


# Predicting gas exchange velocity from SWOT

Median by-river correlation coefficient of 0.91 across 47 rivers



Better carbon emission estimate compared to scaling-based methods

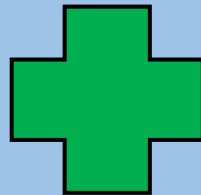
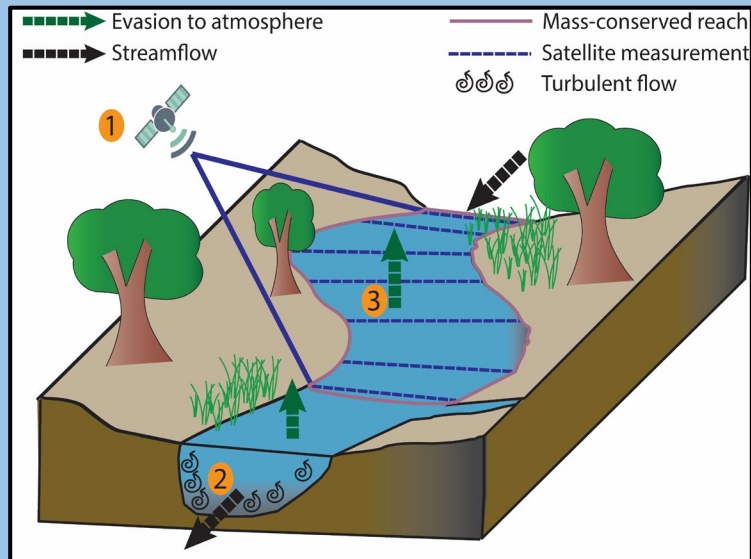




# Looking forward...

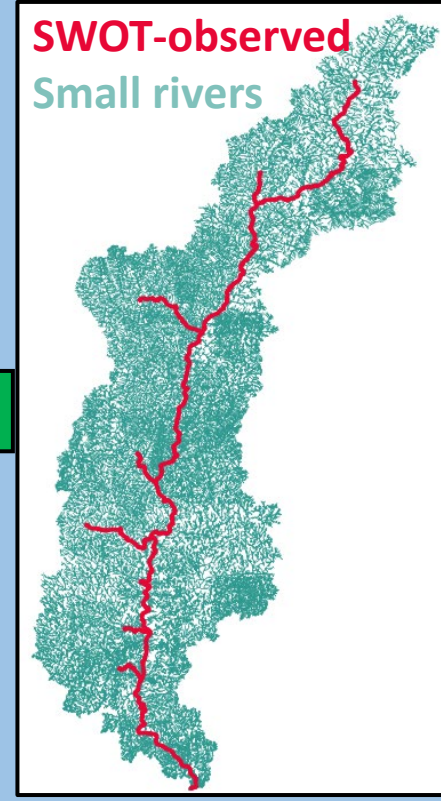
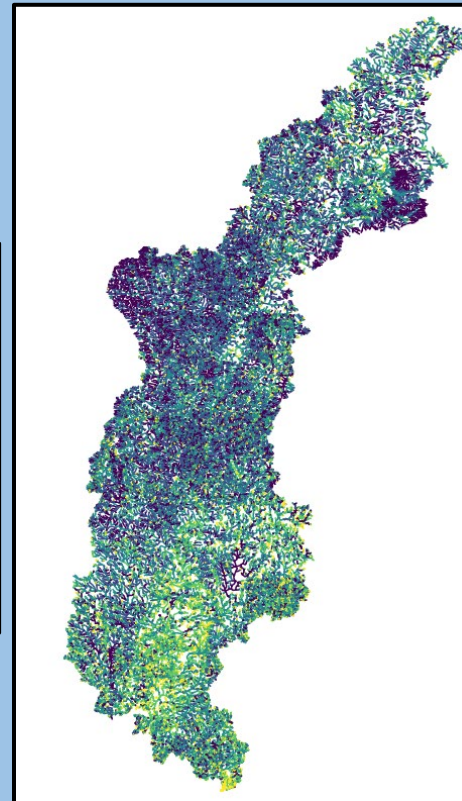
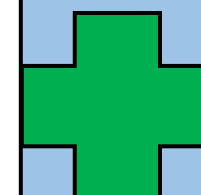
SWOT-inferred gas exchange velocity

Routable CO<sub>2</sub> reactive transport model



CO<sub>2</sub> [ppm]

- 405 - 1000
- 1000 - 1500
- 1500 - 2500
- 2500 - 5000
- 5000+



Connecticut River, US