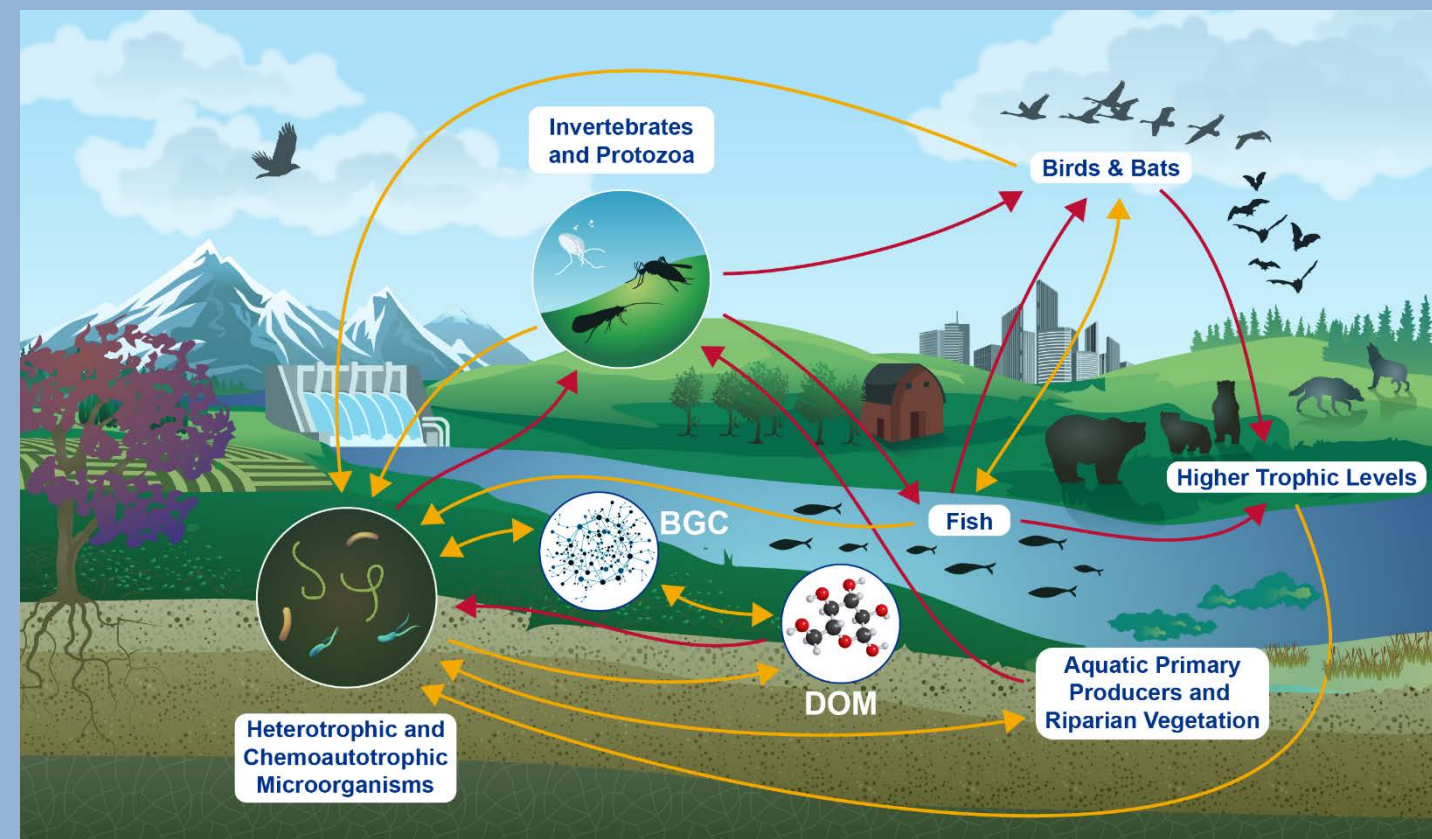


# Data-Model Integration for Prediction of River Corridor and Watershed Function

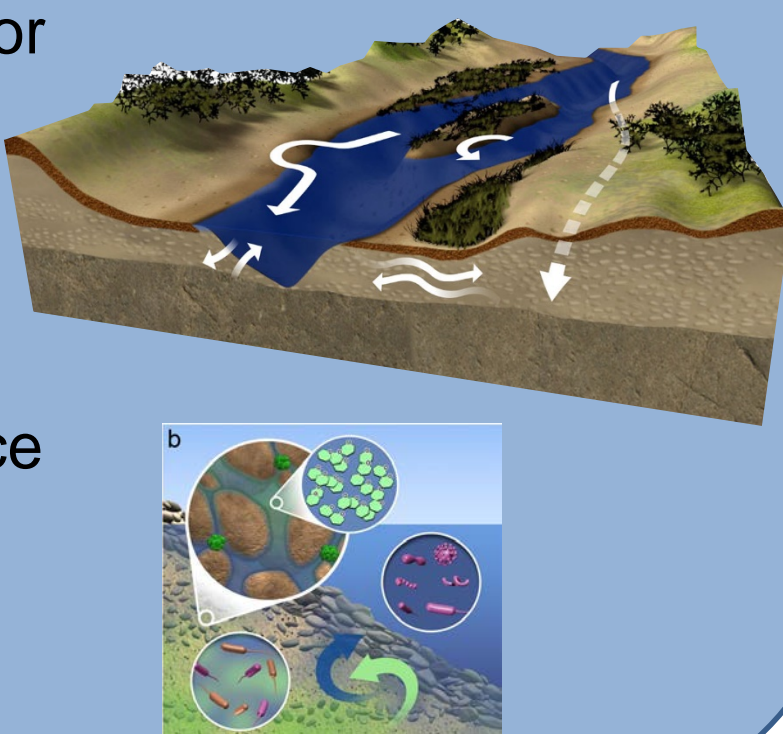
Tim Scheibe, Xingyuan Chen, James Stegen, Maoyi Huang, Vanessa Garayburu-Caruso, Amy Goldman, Emily Graham, Zhangshuan Hou, Tim Johnson, Chris Murray, William Nelson, Bill Perkins, Huiying Ren, Patrick Royer, Hyun-Seob Song, Chris Strickland, Guzel Tartakovsky, Xuesong Zhang, and Yue Zhu



**River Corridor:** A complex system of interacting physical, biological, chemical and human components.

**Hydrologic Exchange Flows (HEFs):** Water exchange between the river channel and other parts of the river corridor. (Harvey 2016)

- ▶ Enhance river corridor biogeochemical function
- ▶ Support riparian vegetation
- ▶ Influence land surface fluxes
- ▶ Modulate surface water temperatures



## Selected 2018 Publications:

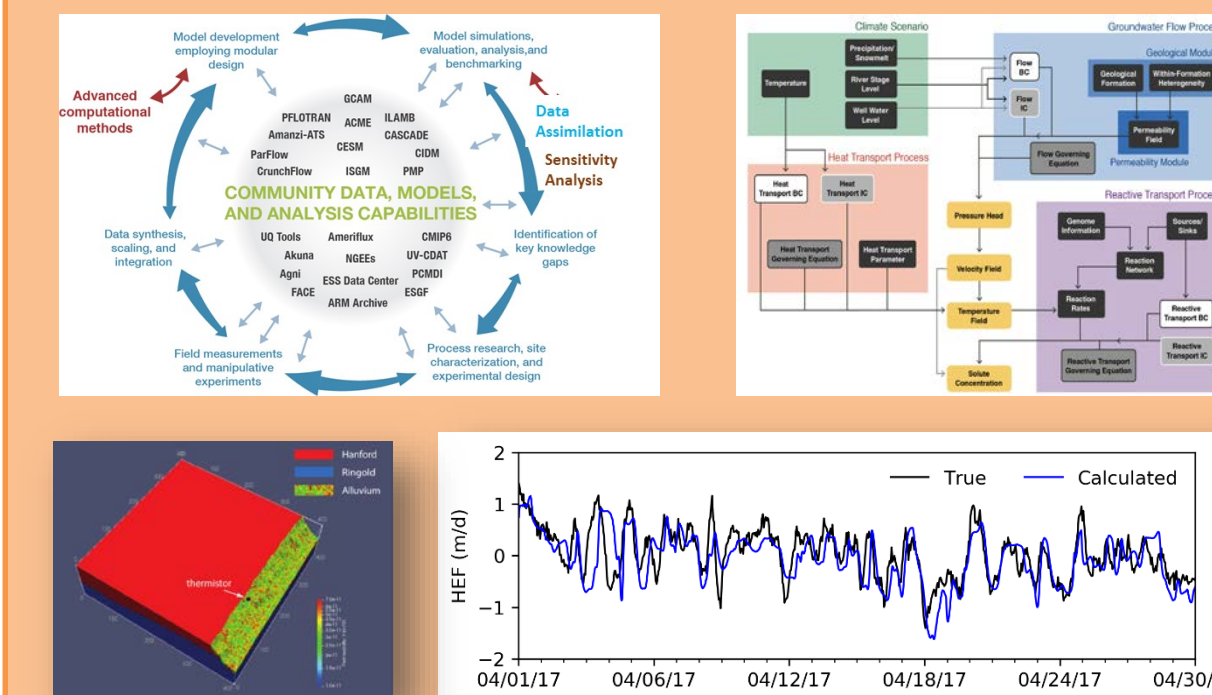
- Graham E. et al., Subsurface biogeochemistry is a missing link between ecology and hydrology in dam-impacted river corridors, *Science of the Total Environment*, doi:10.1016/j.scitotenv.2018.11.414
- Song X., Chen X., Stegen J., Hammond G., Song H., Dai H., Graham E. B. and Zachara J. Drought conditions maximize the impact of high-frequency flow variations on thermal regimes and biogeochemical function in the hyporheic zone. *Water Resources Research*, doi:10.1029/2018WR022586.
- Stegen J. et al. Influences of organic carbon speciation on hyporheic corridor biogeochemistry and microbial ecology. *Nature Communications*, doi: 10.1038/s41467-018-02922-9.
- Bao J. et al. Modulating factors of hydrologic exchanges in a large-scale river reach: Insights from three-dimensional computational fluid dynamics simulations, *Hydrological Processes*, doi:10.1002/hyp.13266.

## Deployment of Intensive Automated Sampling Networks



Mon AM Poster H11H-1556 Tim Johnson  
Mon AM Poster H11H-1564 Yue Zhu

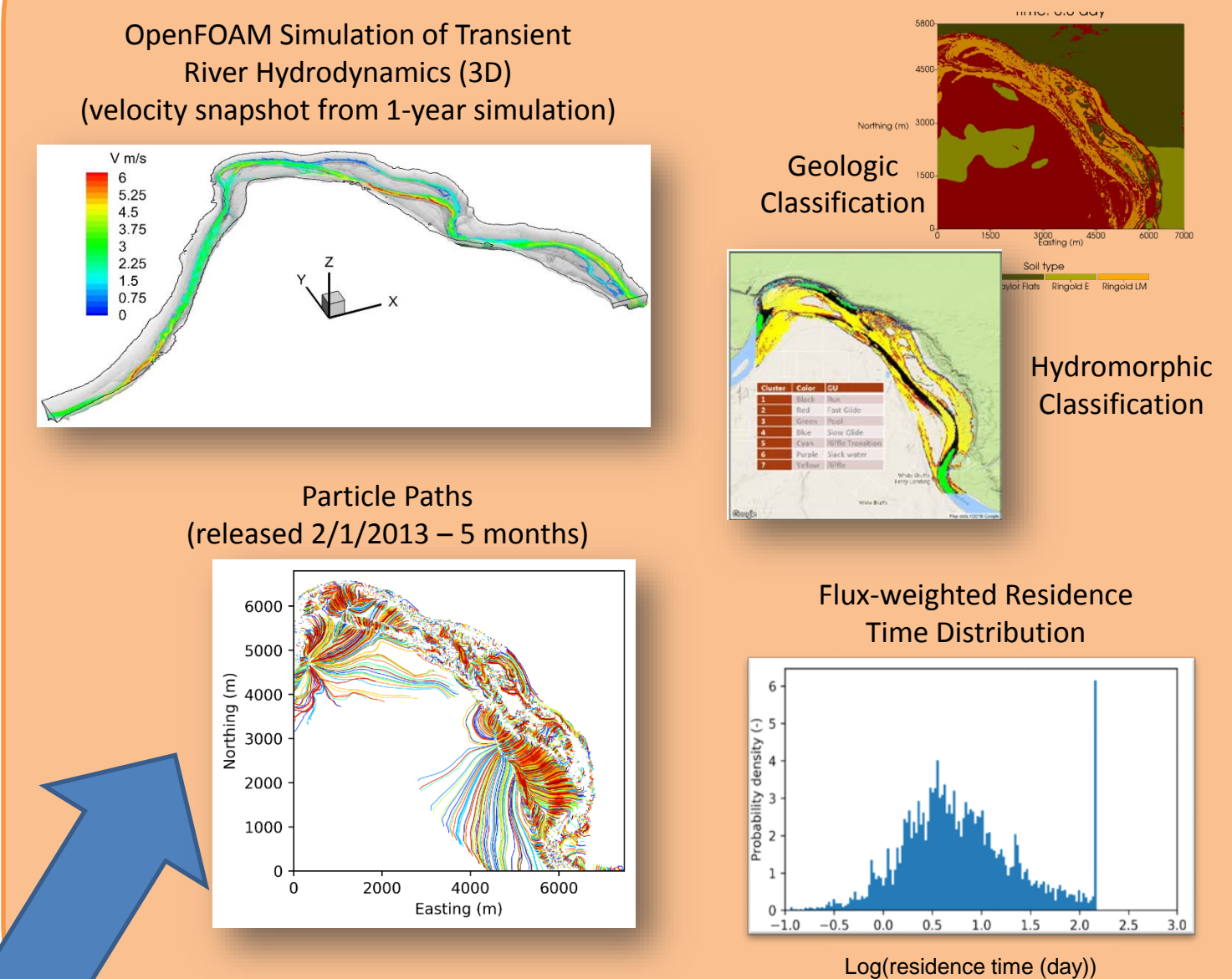
## Data Assimilation using Joint Hydrologic and Geophysical Inversion



Ensemble Smoother-Multiple Data Assimilation (ES-MDA)

Tue PM Poster H23H-1990 Kewei Chen  
Thu PM Poster H43D-2415 Xingyuan Chen

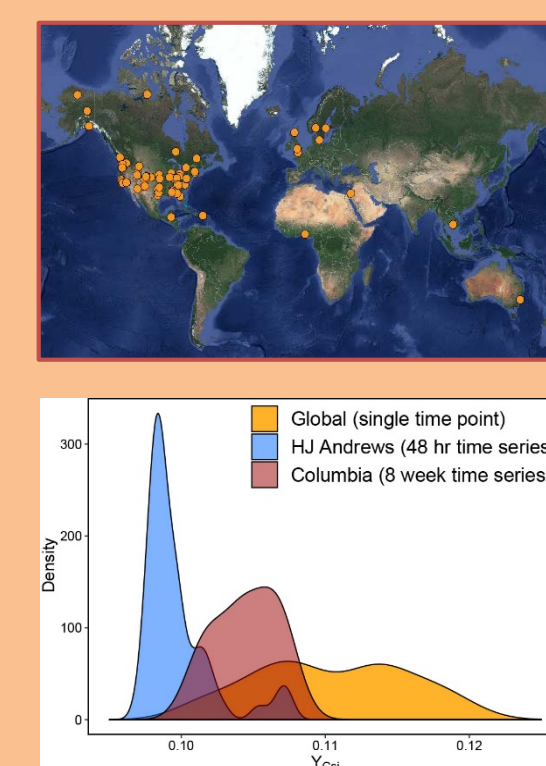
## Hydromorphic Classification and Coupled River-Subsurface Models



Tue 11:05 - 11:20 H22D-04 Rm 151A Jason Hou  
Fri AM Poster B51L-2109 Jie Bao

## Community Science to Broaden and Accelerate Transferability

WHONDRS global network spans spatial and temporal scales to understand drivers of parameter variation across different systems



- ▶ Water samples collected by network participants; FTICR-MS analysis performed at EMSL
- ▶ Data provided back to participants and openly to the science community
- ▶ Intensive local studies (8 weeks), shorter time scales (48 weeks) more distributed, snapshots widely distributed.



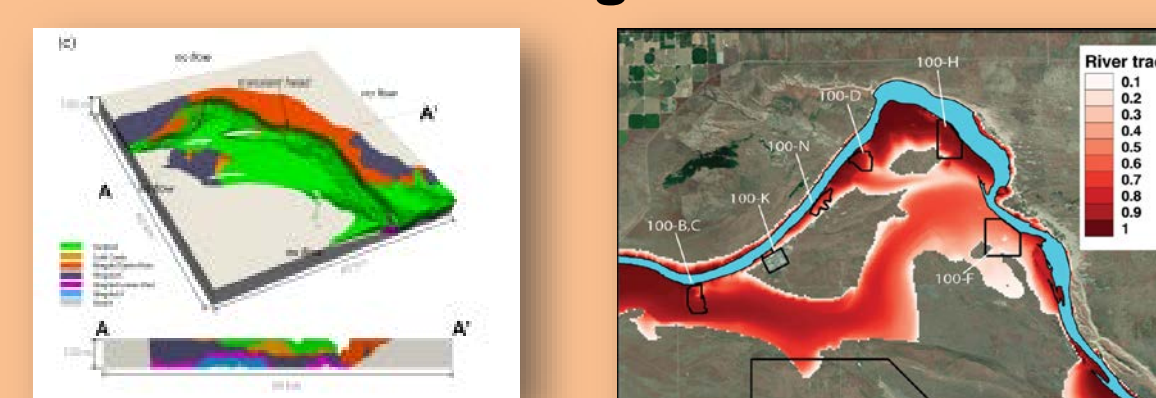
• <https://whondrs.pnnl.gov>  
• WHONDRS@pnnl.gov  
• @WHONDRS

Town Hall and Mixer Thursday  
Exhibit #616

Thu 9:00-9:15 B41D-05 Rm 150A James Stegen

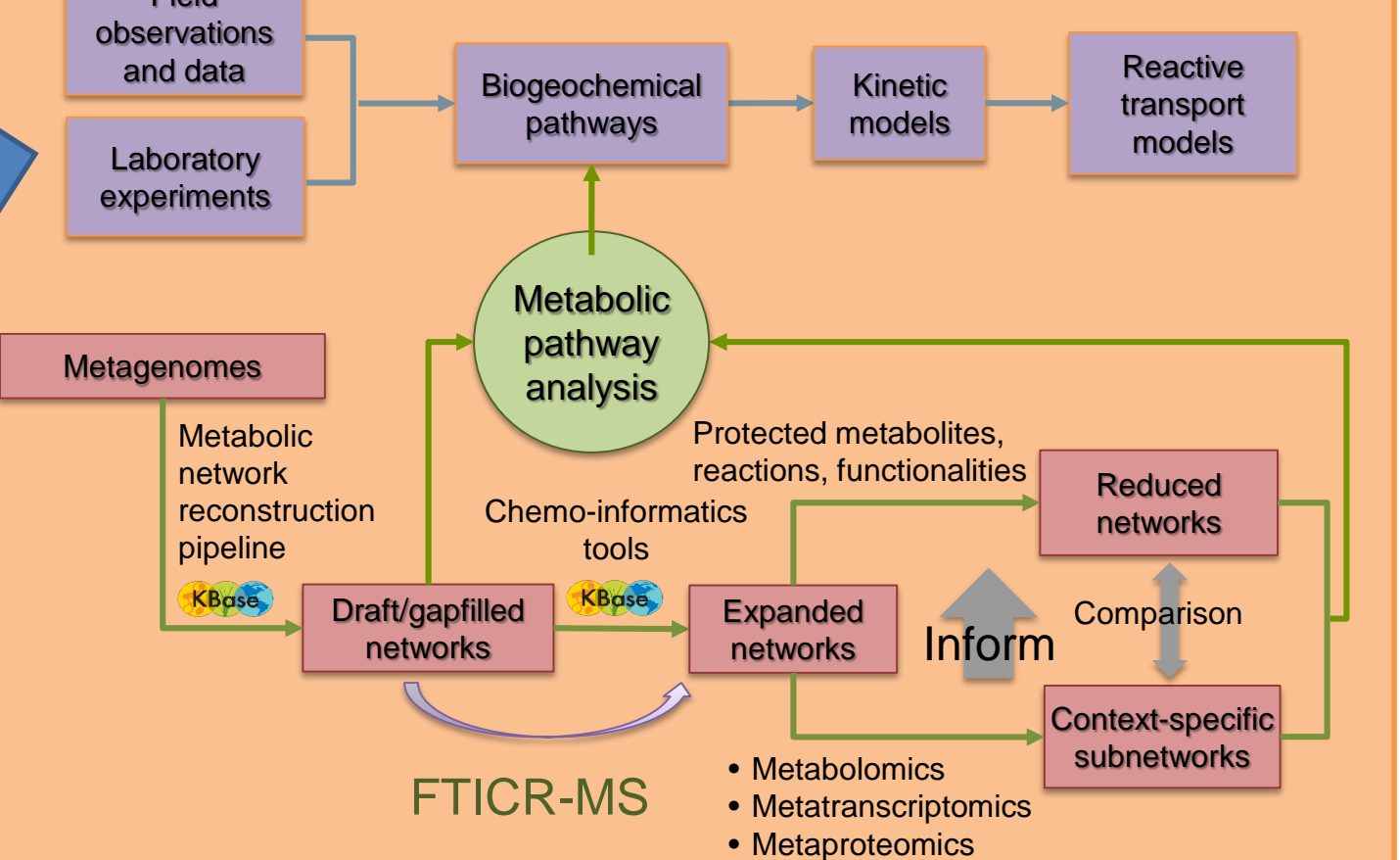
## Columbia River Hanford Reach: An ideal testbed for river corridor research

## Reach-Scale Model of Hydrologic Exchange Flows



Tue PM Poster H23H-1997 Pin Shuai

## Multi-Omics Integration to Develop New Biogeochemical Reaction Networks



Wed 2:25-2:40 H33F-04 Rm 146B Vanessa Garayburu-Caruso  
Fri 08:45 - 09:00 B51B-04 Rm 150A Hyun-Seob Song

