Four-Dimensional Electrical Conductivity Monitoring of Stage-Driven River Water Intrusion: Accounting for Water Table Effects Using a Transient Mesh Boundary and Conditional Inversion Constraints

Objectives

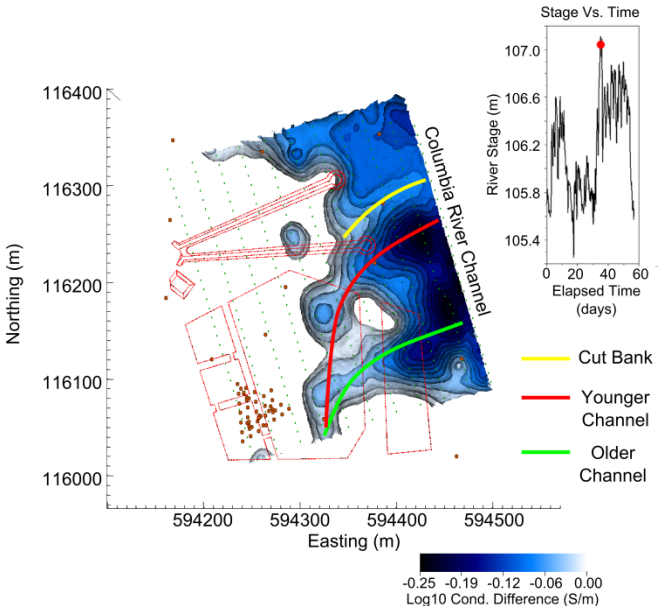
- Based on the specific conductance contrast between groundwater and river water, use time-lapse 3D electrical resistivity tomography to image stage-driven groundwater/river-water interaction.

Approach/Results

- An adaptive inversion mesh is developed to remove the confounding influence of the changing water table.
- Customized inversion constraints are used provide the inversion with prior information, thereby improving resolution
- Advancements enable high-resolution 3D monitoring that was not successful with standard inversion approaches.

Significance and Impact

- New understanding of groundwater/river water mixing patterns that influence biogeochemical activity.
- New approach enabling high resolution 3D monitoring of groundwater/surface water hydrodynamics in the presence of a moving water table.



3D plan view ERT image of river water intrusion into the Hanford 300 Area during high river stage.

Johnson, T., R. Versteeg, J. Thomle, G. Hammond, X. Chen, and J. Zachara (2015), Four-dimensional electrical conductivity monitoring of stage-driven river water intrusion: Accounting for water table effects using a transient mesh boundary and conditional inversion constraints, *Water Resources Research*, **51**, doi:10.1002/ 2014WR016129.