Hydrogeophysical Evaluation of the Washita Alluvium & Terrace Aquifer in Western Oklahoma

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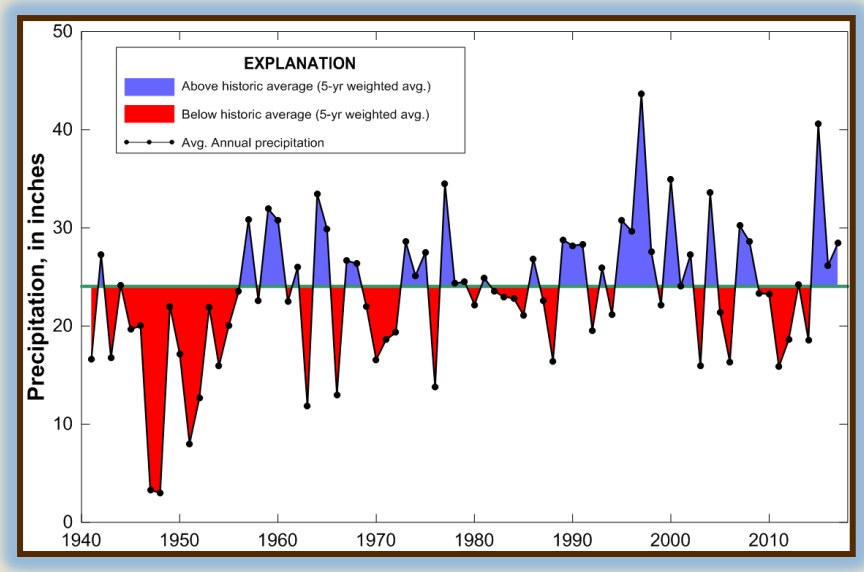
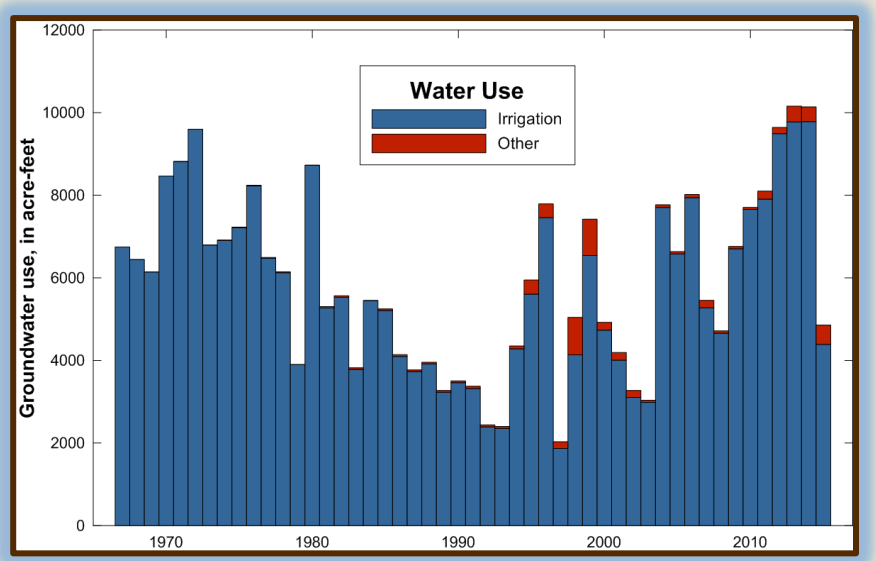
Drought Resiliency





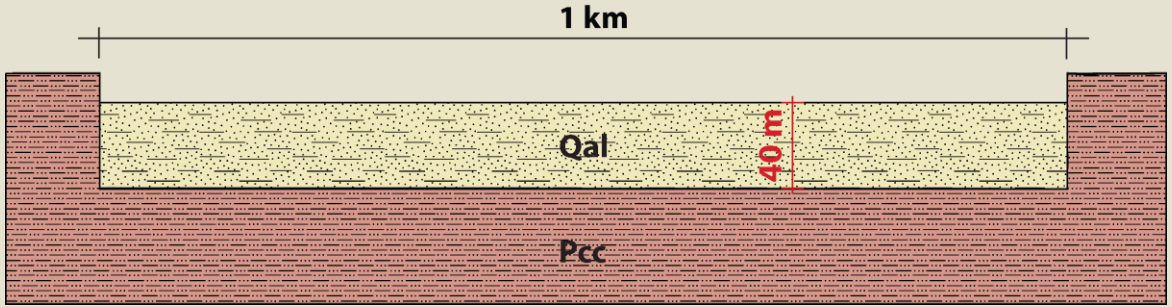
Hypothesis

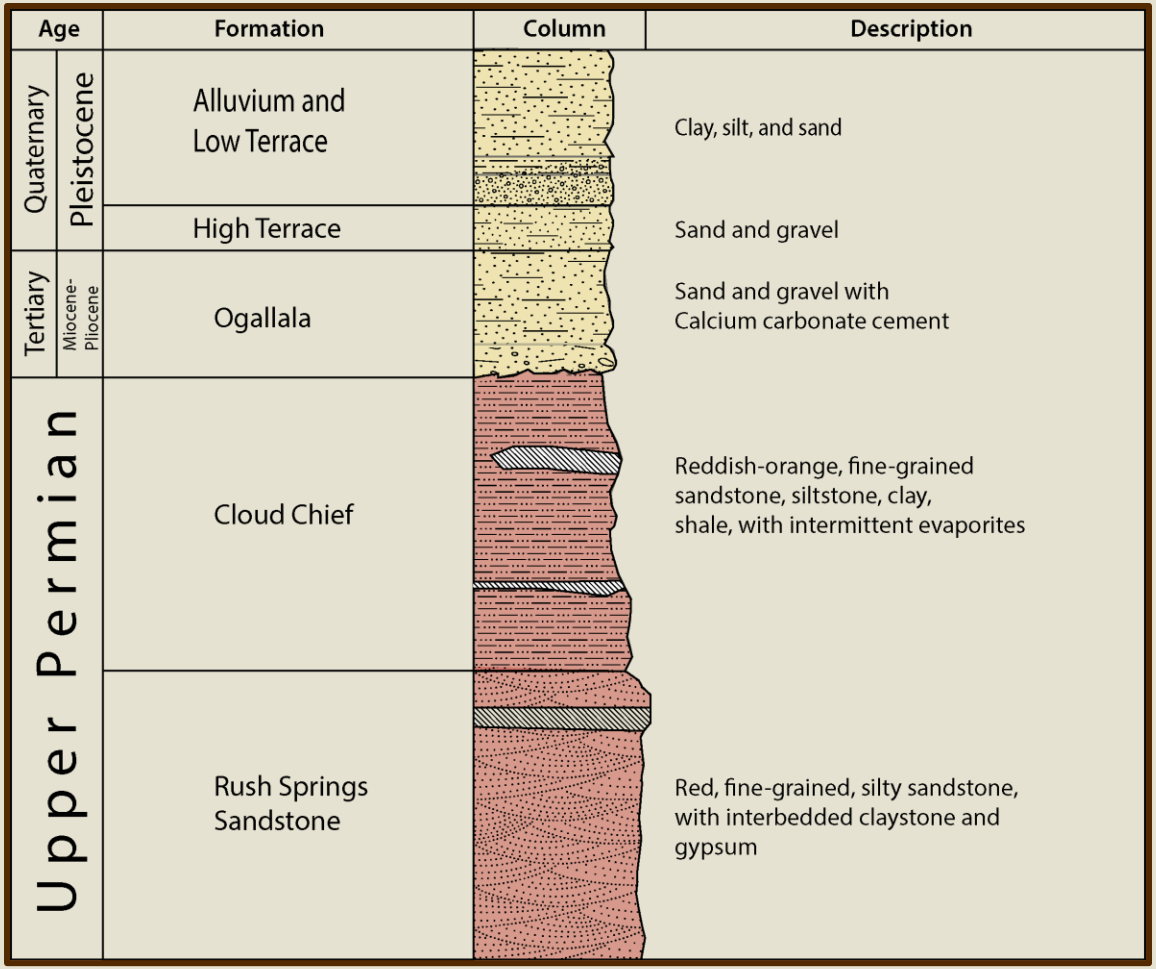
Incised valleys may exist in these settings, but are difficult to find using existing water exploration data

Can surface electrical methods elucidate incised valley structure and hydrogeology at the kilometer scale?

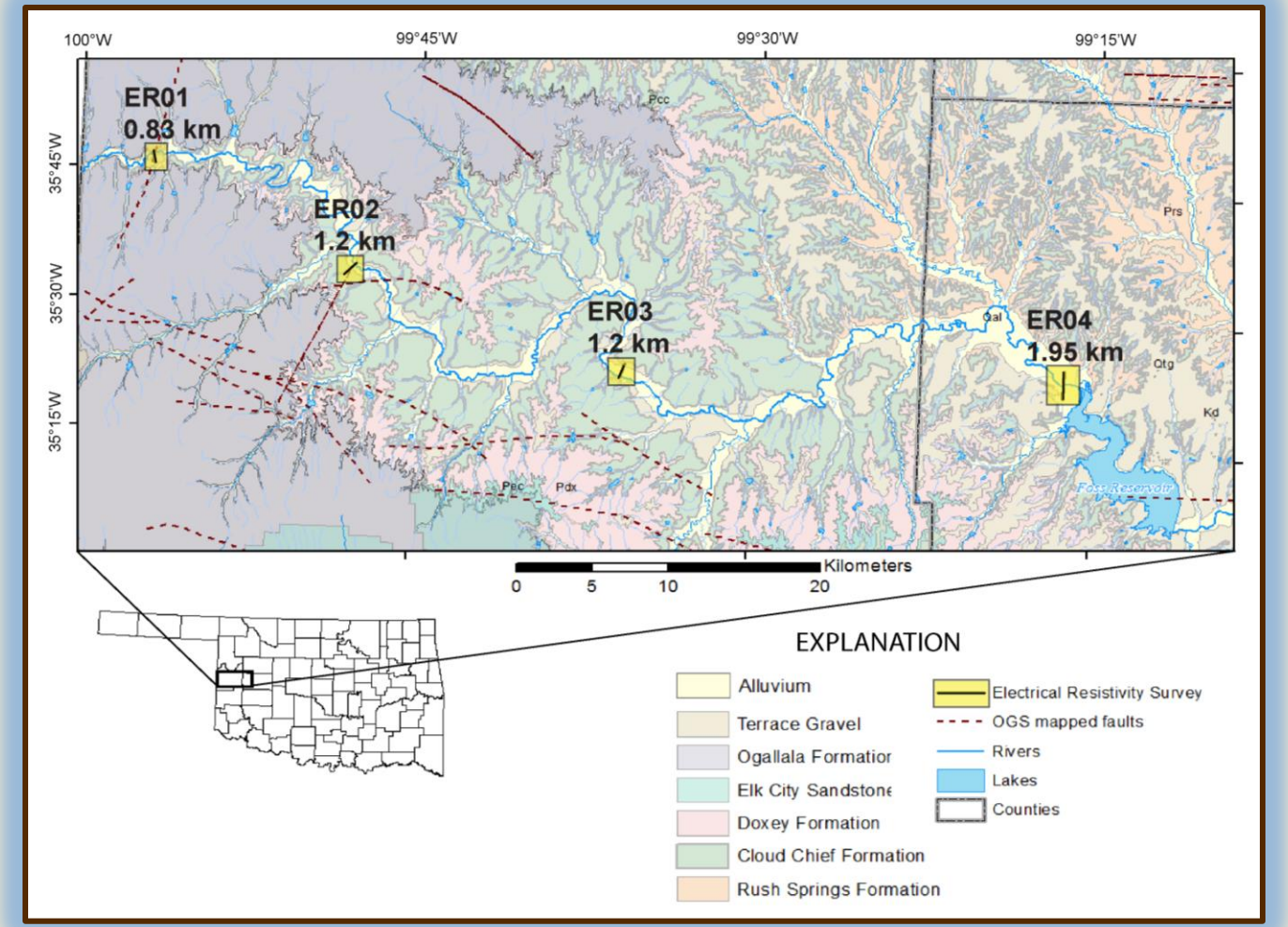
Current Conceptual Model

- Alluvium – 40 m
- Bedrock – Permian redbeds
- Resolution- 3 m, line length 330 m



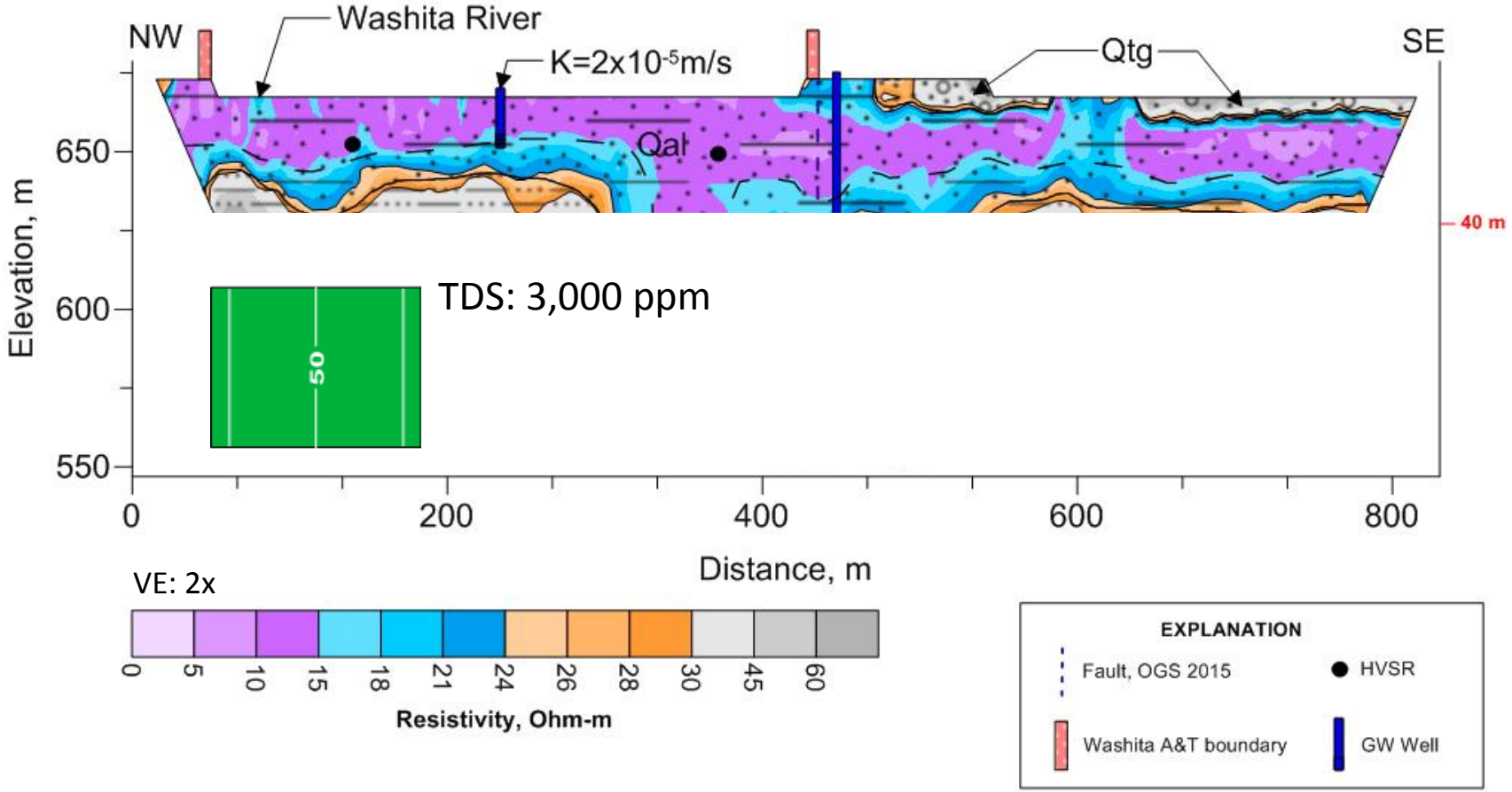


Modified, Schipper 1986

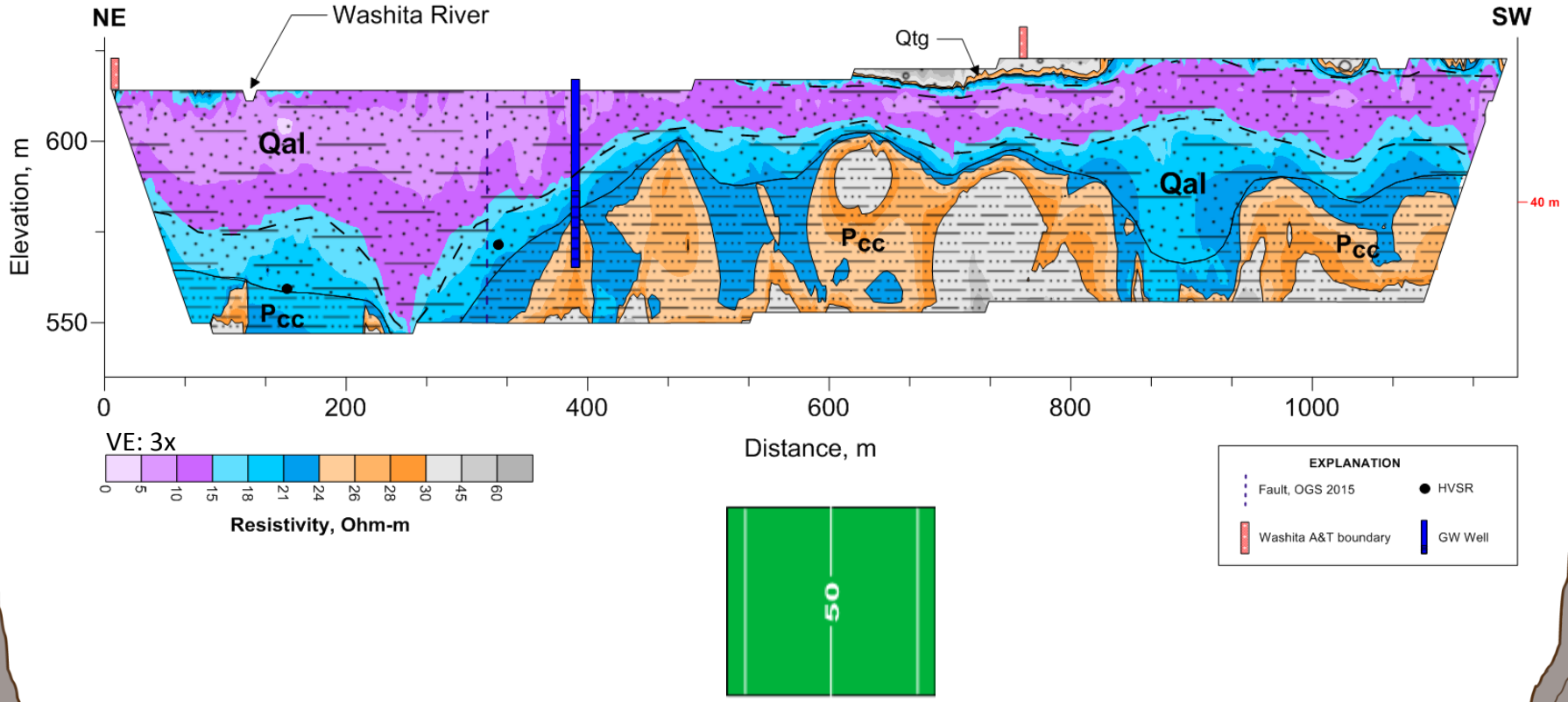

100°W
99°45'W
99°30'W
99°15'W
35°45'W
35°30'W
35°15'W
ER01
0.83 km
ER02
1.2 km
ER03
1.2 km
ER04
1.95 km
Pcc
Prs
Qal
Qtg
Kd
Pec
Pdx
Fort Reservoir
Kilometers
0
5
10
20
EXPLANATION
Alluvium
Terrace Gravel
Ogallala Formation
Elk City Sandstone
Doxey Formation
Cloud Chief Formation
Rush Springs Formation
Electrical Resistivity Survey
OGS mapped faults
Rivers
Lakes
Counties

Methods

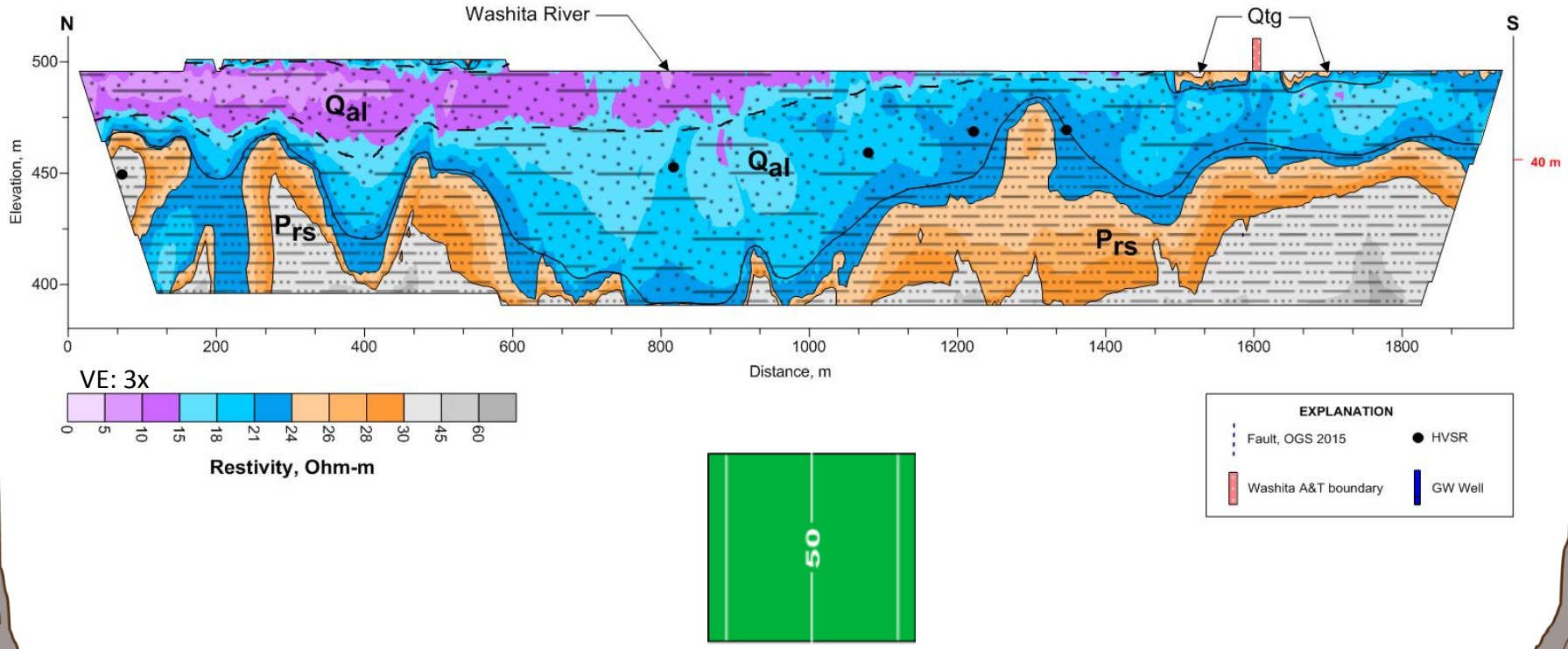
ER01 - Black Kettle National Grasslands



ER02 – NW of Cheyenne, Ok

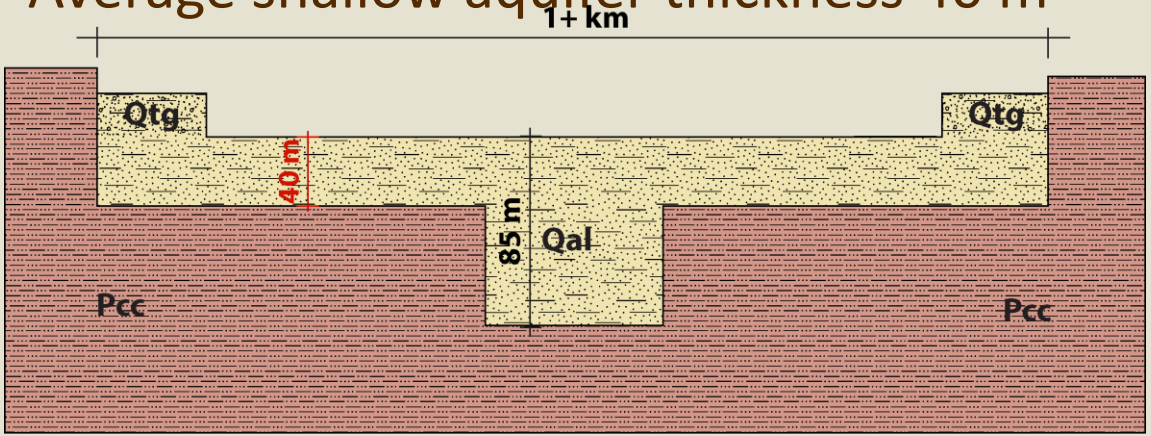


ER04 - Washita National Wildlife Refuge near Foss Reservoir



New conceptual model of the aquifer

- Average shallow aquifer thickness 40 m



- Deep channel present, up to 85 meters deep and 170-550 m wide
- Water quality higher
- Structurally controlled
- Resolution- 5 m, line length 550 m

Future work:

- Determine the hydrogeology of the buried channel
- Investigate water quality of different components
- Fluid contributions from bedrock?
- Do other nearby streams have similar subsurface characteristics?

Acknowledgements/Questions

- Oklahoma Water Resources Board

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  - Clay Fitzgerald
  - Spencer Harris
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- Aestus LLC

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Blum M. D., Valastro S., 1994. Late Quaternary sedimentation, lower Colorado River, Gulf Coastal Plain of Texas. Geological Society of America Bulletic, v. 106, p. 1002-1016.

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