
Hydrological subsurface characterization with geophysical methods

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Geophysics can contribute to ...

- structural characterization
- fluid dynamics
- hydrogeological parameters

Examples:

- *Infiltrations in vadose zone*
- *Groundwater storage and flow*
- *Contaminant transport*

- How do we usually study these problems? – observe, describe, and model data

Geophysical methods with relevance to hydrology

Electrical / electromagnetic methods:

- Water content, water flux
- Water quality (contaminants)
- Aquifer structure and groundwater
- Pore space and pore fluids

Seismic methods:

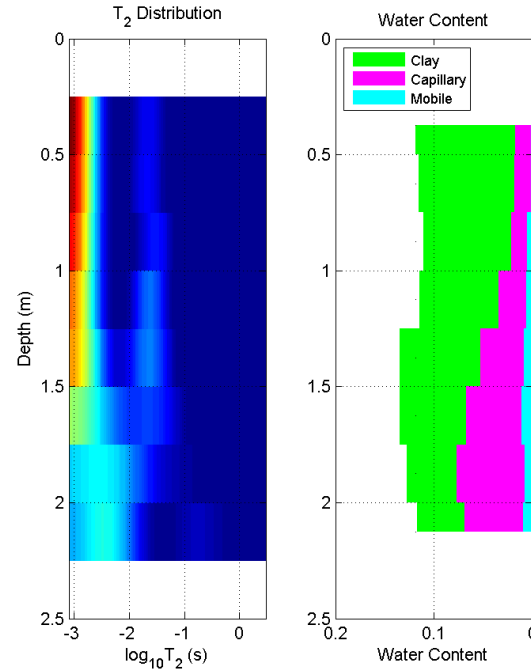
- Aquifer structure and groundwater
- Pore space and pore fluids

Equipment and expertise at OU and KU:

- Active & Passive Seismic
- Ground Penetrating Radar (GPR)
- Electrical Resistivity Tomography (ERT)
- Gravimetry
- Nuclear Magnetic Resonance (NMR)

Hydrologic characterization of interbedded shale - carbonate systems

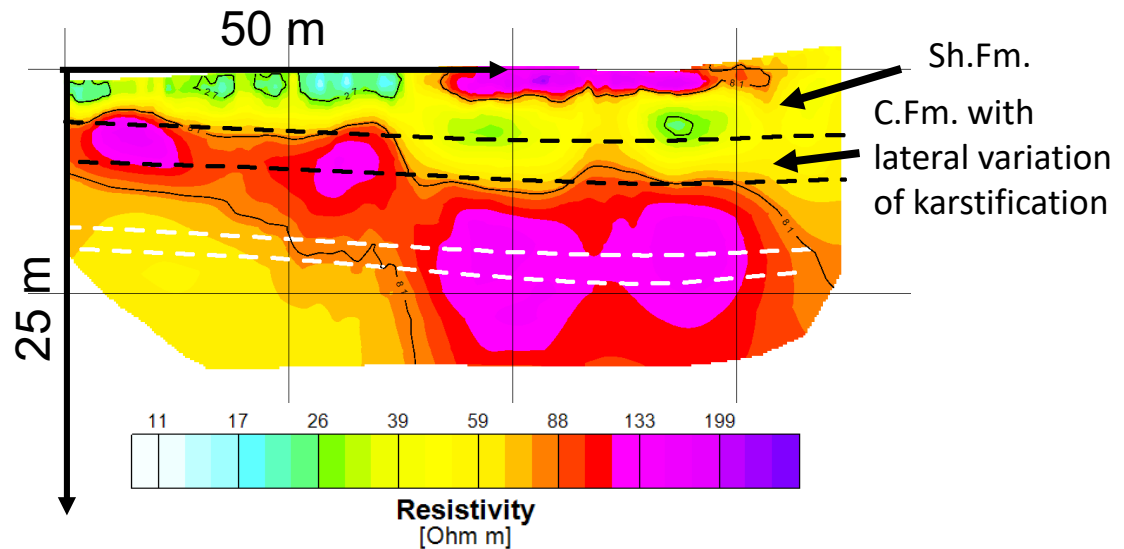
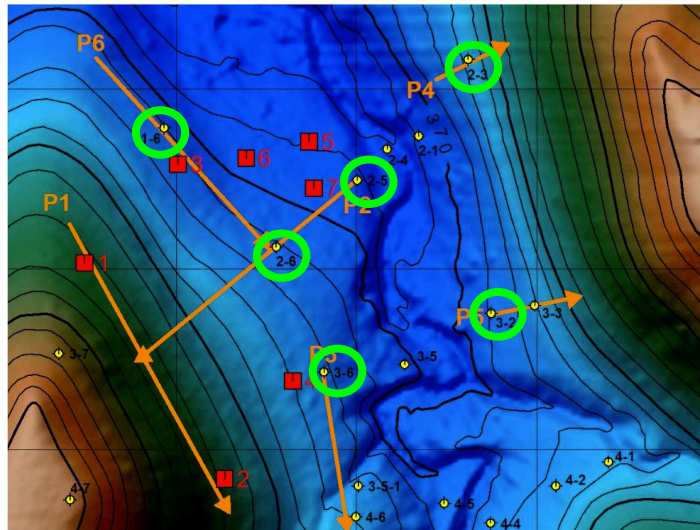
Flint Hill Prairie, Kansas



Joint application of ERT,
NMR, GPR

Karstification + discharge
patterns

Total water content



Acquifer exploration

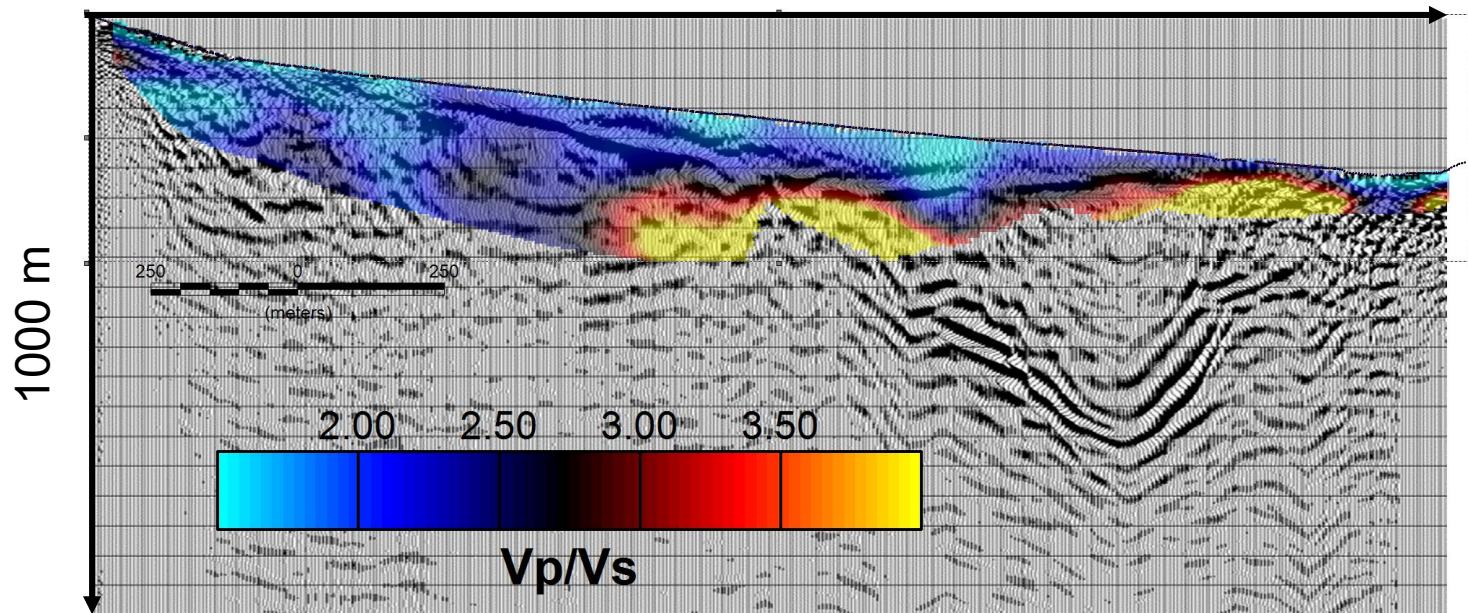
Unaweep Canyon, Colorado



Active and passive seismic in an alpine valley in an arid region

High P-to S-velocity ratio is indicative of fluid-filled and highly porous sediments

2500 m



Time-lapse hillslope moisture monitoring

Kansas, KU field site (MSc thesis M. Okeson)

Long- and short term dynamic response of soil and shallow subsurface to precipitation and subsurface flow patterns

Time-lapse electrical resistivity tomography images presence or lack of water

Joint interpretation with other data: quantitative estimation of total water content

