

# Geophysical solutions to enhance MAR siting and monitoring

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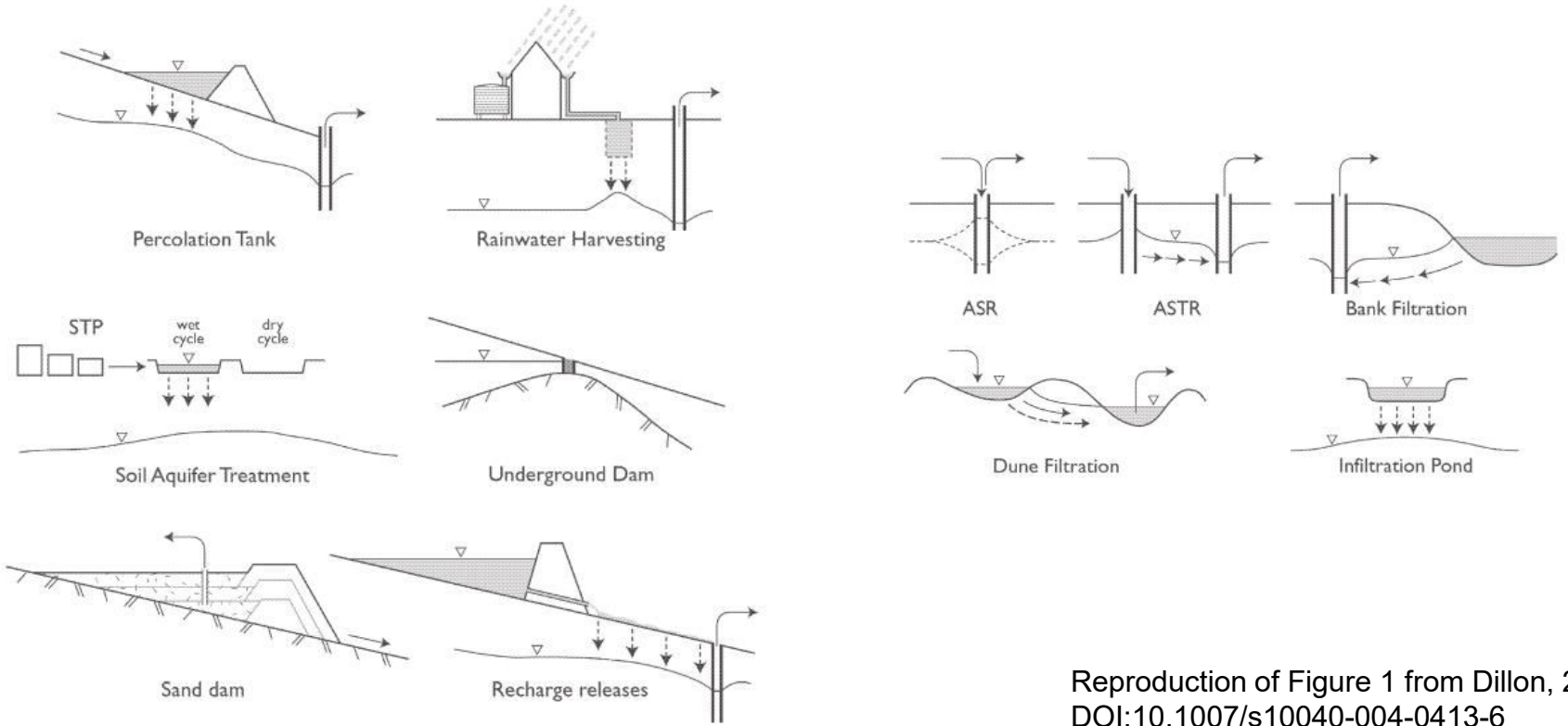


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# Managed Aquifer Recharge



Reproduction of Figure 1 from Dillon, 2005.  
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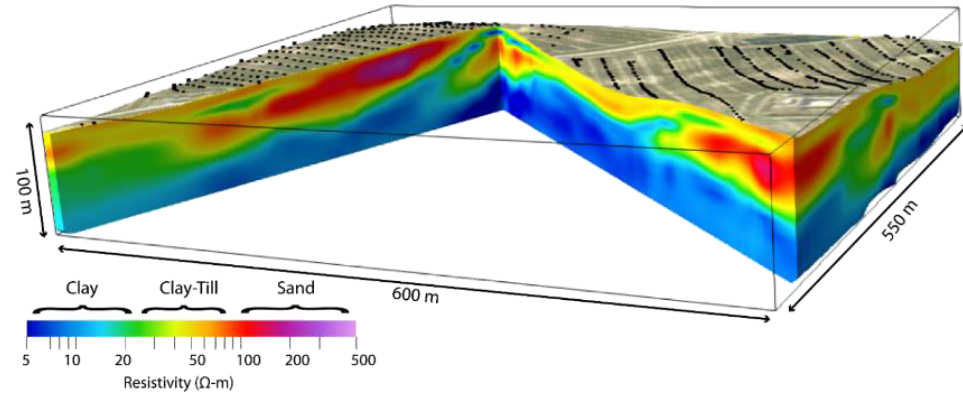


# Non-invasive imaging

Geophysical scanner



Geophysical image



# Transient Electromagnetics

Ground-based



Towed



Airborne



# Transient Electromagnetics

## Ground-based



- deep penetration
- inexpensive
- poor data density

## Towed



- shallow penetration
- inexpensive
- dense data coverage

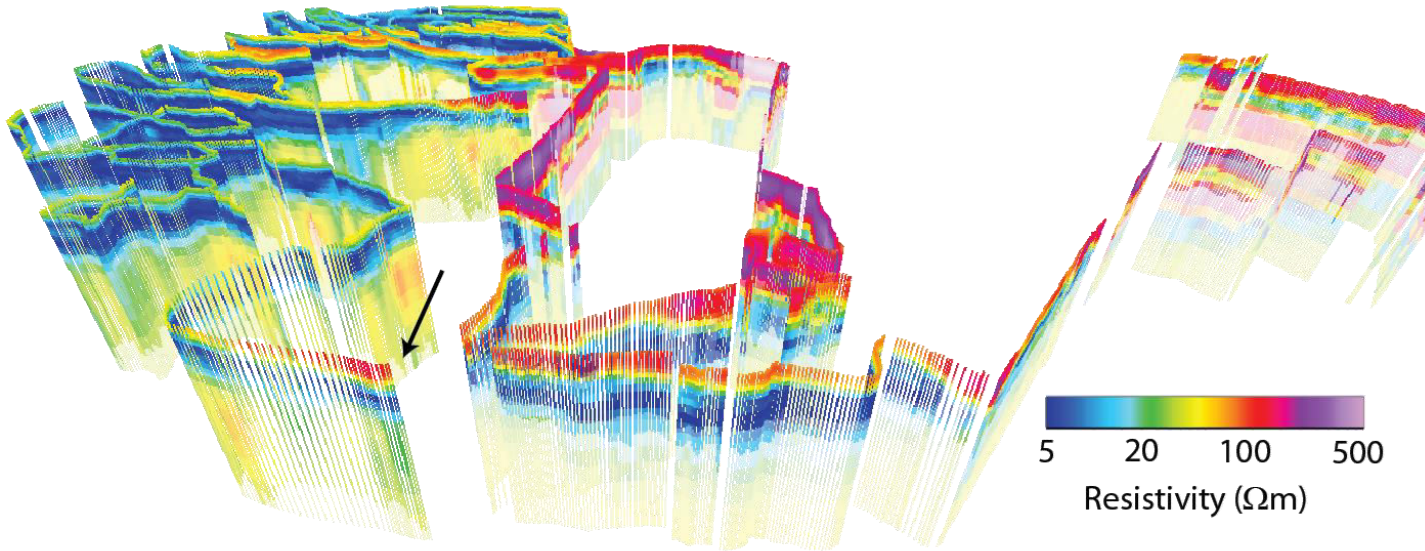
## Airborne



- deep penetration
- expensive
- dense data coverage



# The value of geophysics



## Building hydrological interpretations

- Rapid hydrogeological characterization
- Fill data gaps between boreholes
- Capture key structural controls of groundwater systems



# The tTEM system

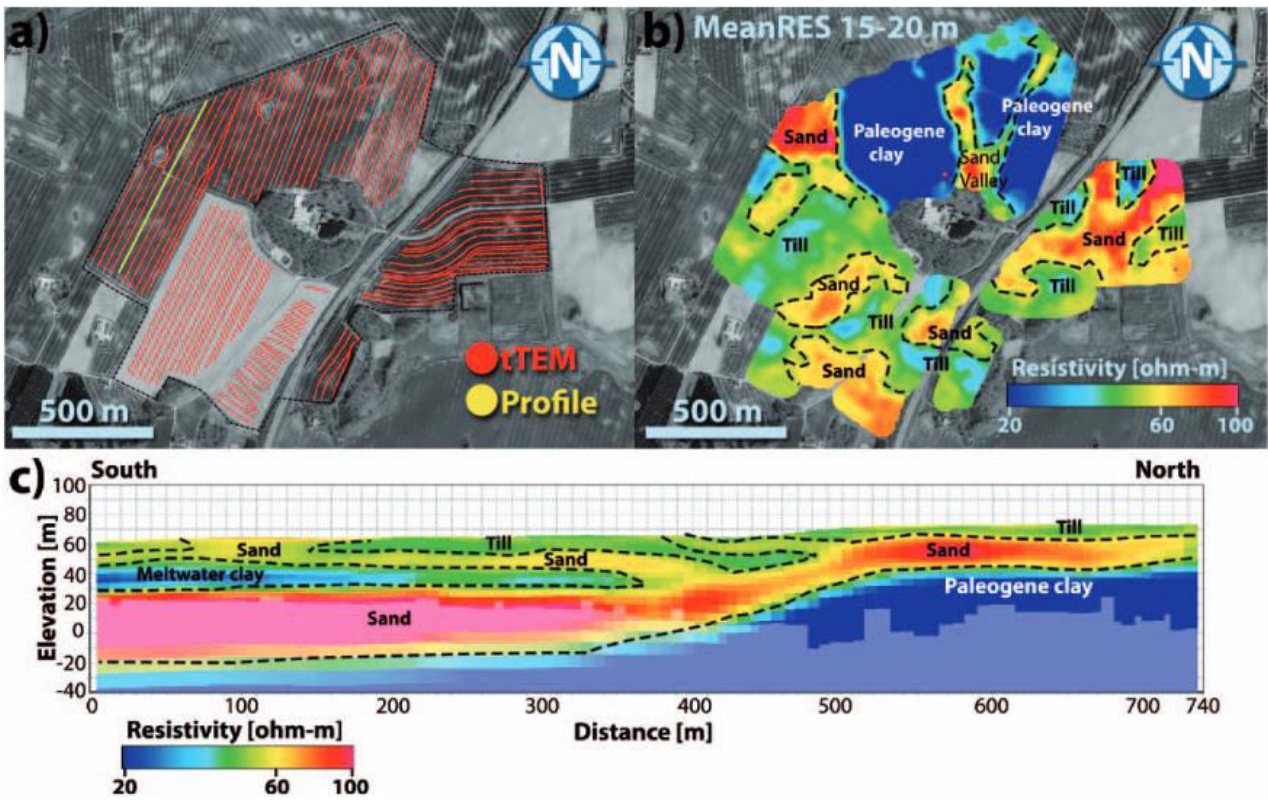


## Mapping specifications

- 25 km/h driving speeds (terrain permitting)
- >100 hectares or >75 kms mapped per day
- ~100 m depth penetration\
- ~3-5 m lateral resolution

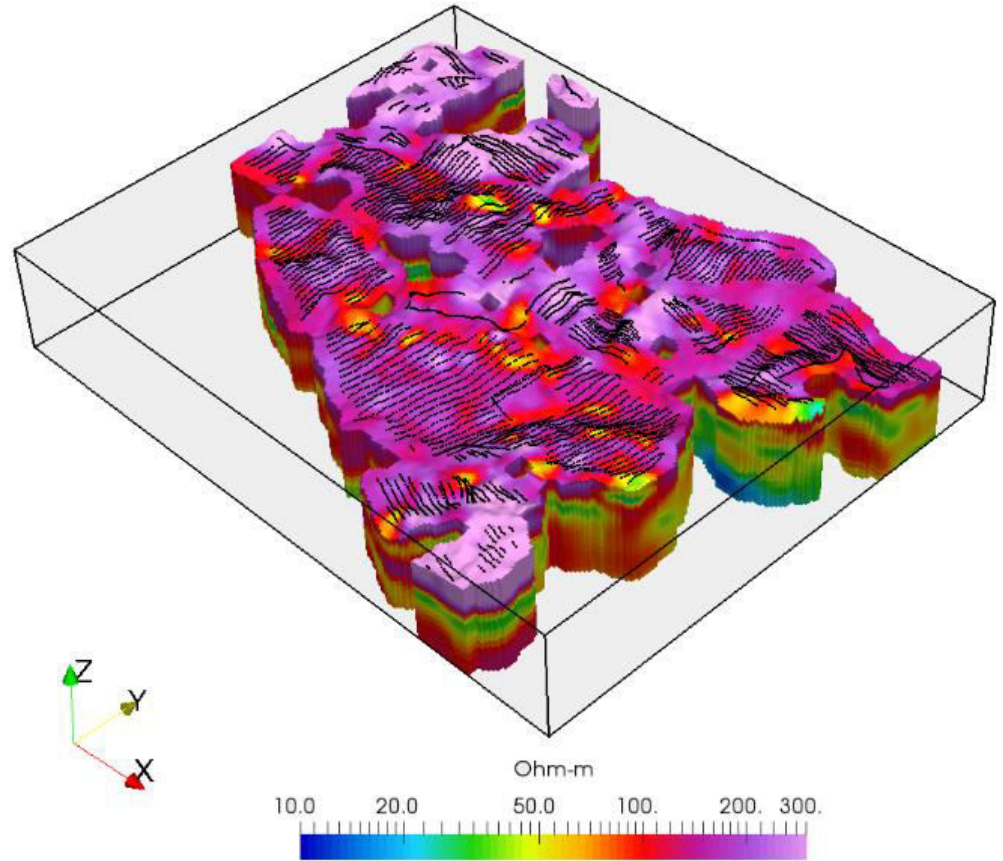
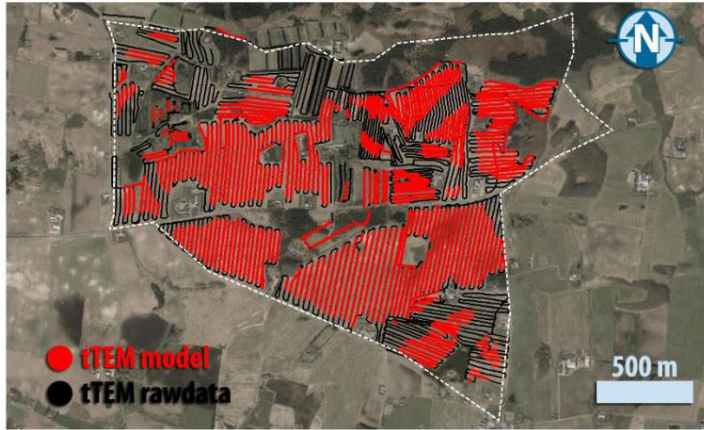


# Field-scale characterization

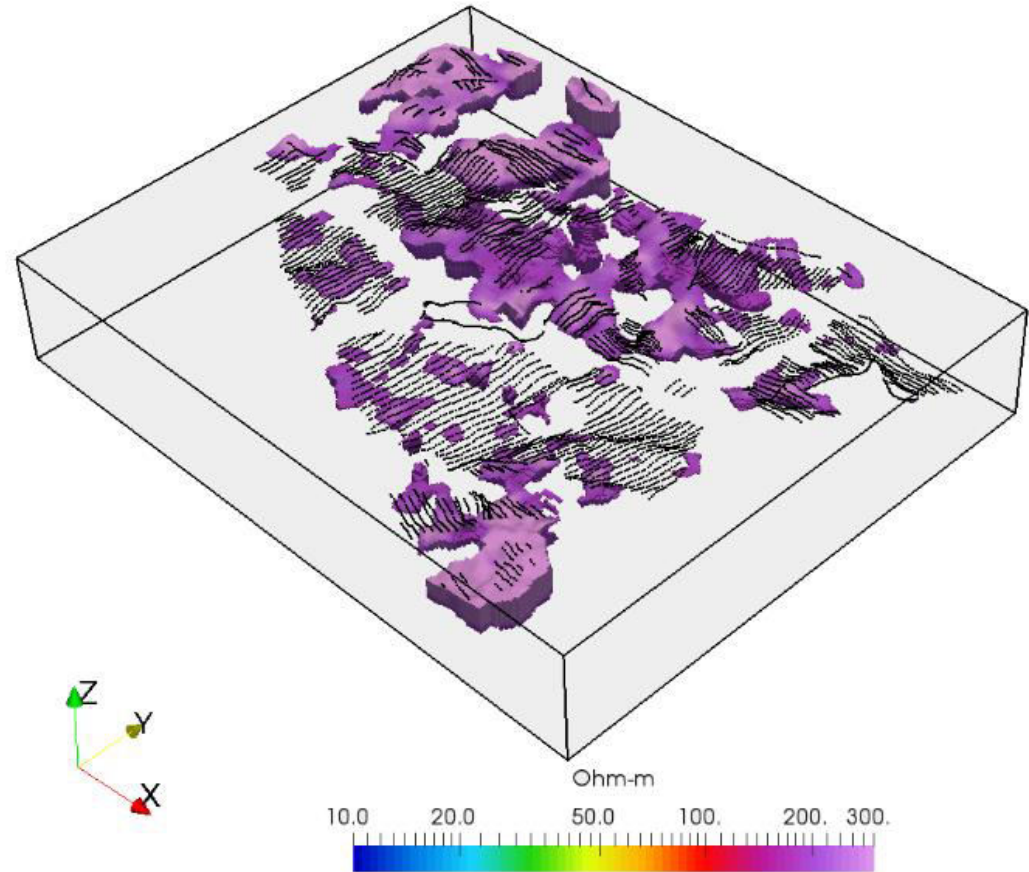
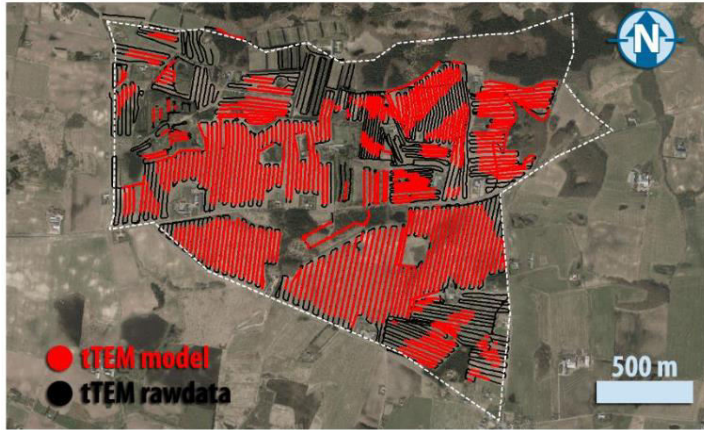




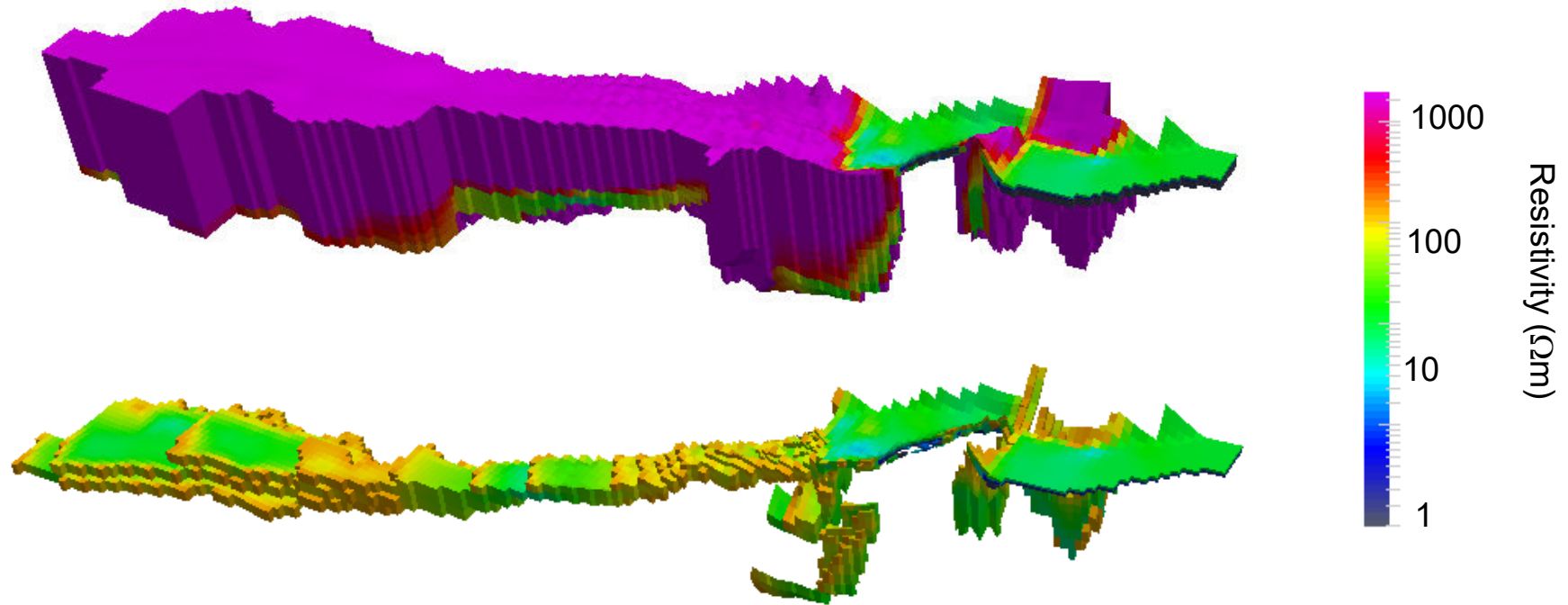
# Aquifer delineation



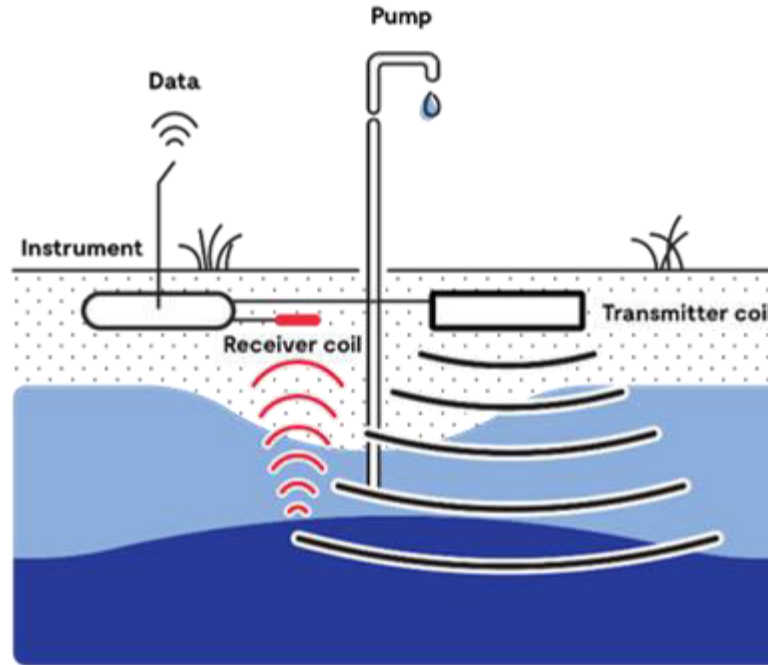
# Aquifer delineation



# Aquifer delineation (regional scale)



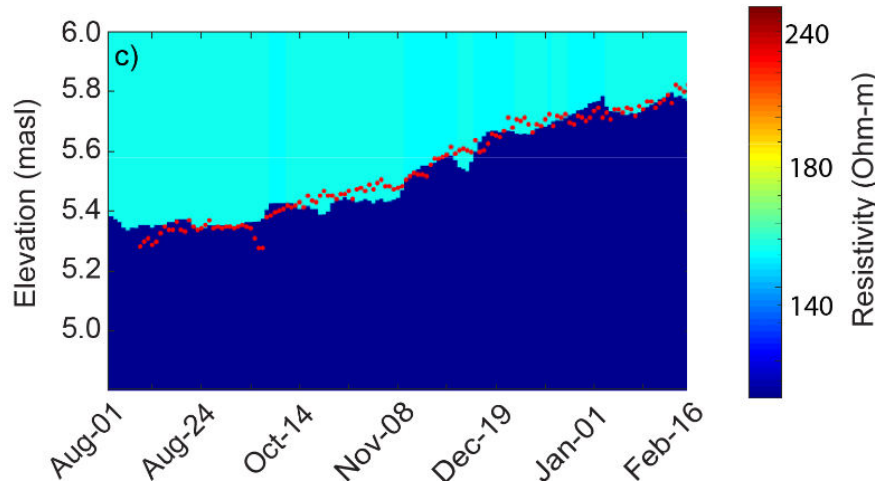
# Monitoring TEM



# Monitoring TEM



# Monitoring TEM



# Takeaways

- Geophysical methods well-suited to define key structural controls on groundwater systems
- Enhance prediction of water flow, retention, protection
- Non-invasive solutions at multiple scales

