Rapid assessment of groundwater levels in the Northern Adelaide Plains using seismic data

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Rapid Assessment of Groundwater Levels

• Goal: Determine a method to rapidly measure groundwater levels.

Seismic Velocity

Electrical Conductivity

Volumetric Water Content
Study Site
Nano TEM Results

4x Vertical Exaggeration

Distance (m)

Elevation (m)

Conductivity (usM)

150 300
S-wave Results

4x Vertical Exaggeration

Distance (m) vs Elevation (m)

$V_s$ (km/s)

200 400
P-wave Results

4x Vertical Exaggeration
$V_p/V_s$ Results

4x Vertical Exaggeration
$V_p/V_s$ and Measured Water Level

6.8 m Below Ground Surface

4x Vertical Exaggeration
Interpretation

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Interpretation

Interpreted Piezometric Surface

Fresh Water (?)
Interpretation

Recharge Zone
Is the Vadose Zone Really Unsaturated?

5-10% Volumetric Water Content
Identifying High Risk Areas
Conclusions

• Seismic methodologies have the potential to rapidly map the water table over 100s of meters

• Limitations
  • Water table must be within the range of 3-10 m
  • Uncertainty of the water table estimate
  • Differentiating lithological vs. hydrological changes
Thank you

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