Research gaps and technology needs for monitoring CO_2 leakage at faults

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CO2 CRC
BUILDING A LOW EMISSIONS FUTURE

CO2GeoNet
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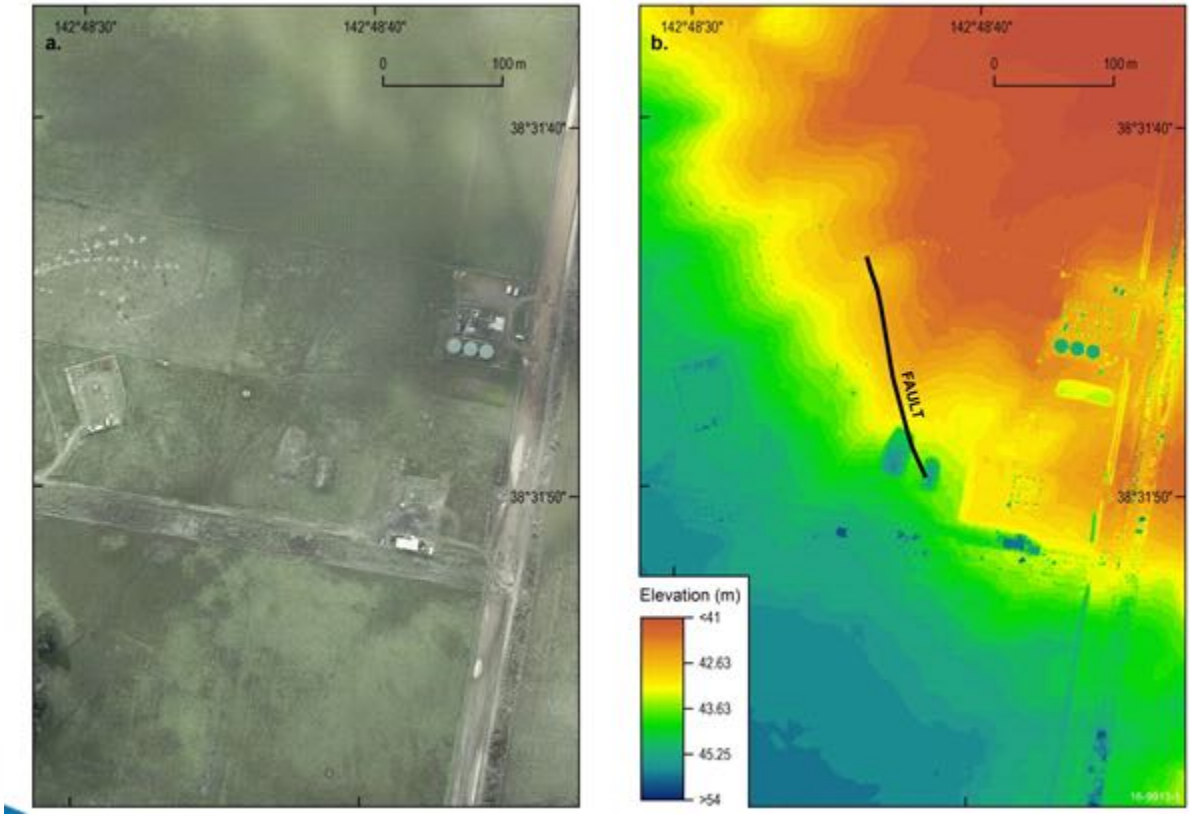
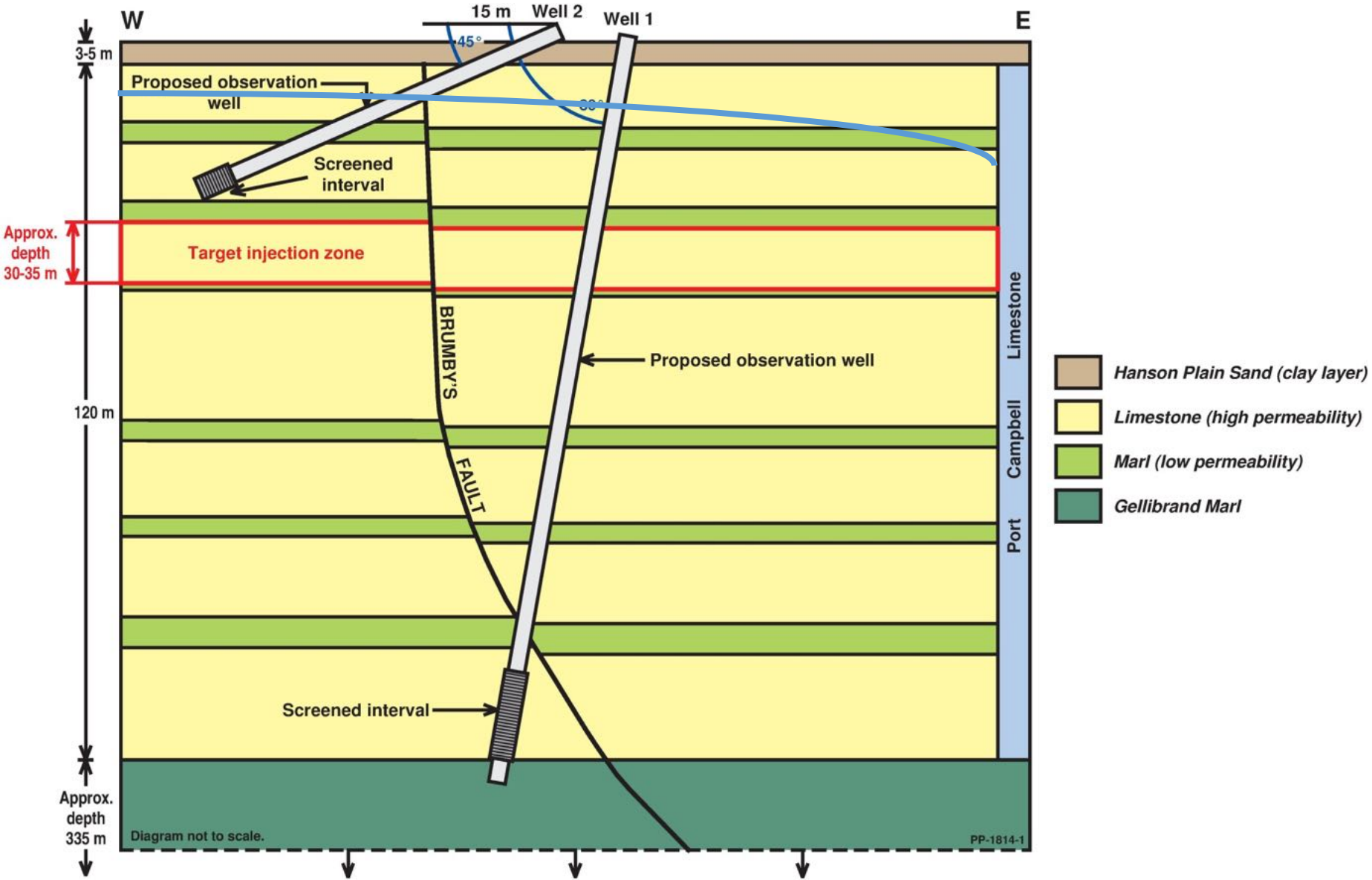
Surface topology from LIDAR

- Vertically exaggerated, apparent ridges and swales (5x)
- Karstic features clear south of paleo quaternary dunes
- North of paleo dune, covered with clay

DEM – no obvious surface expression of fault



Sloping groundwater table



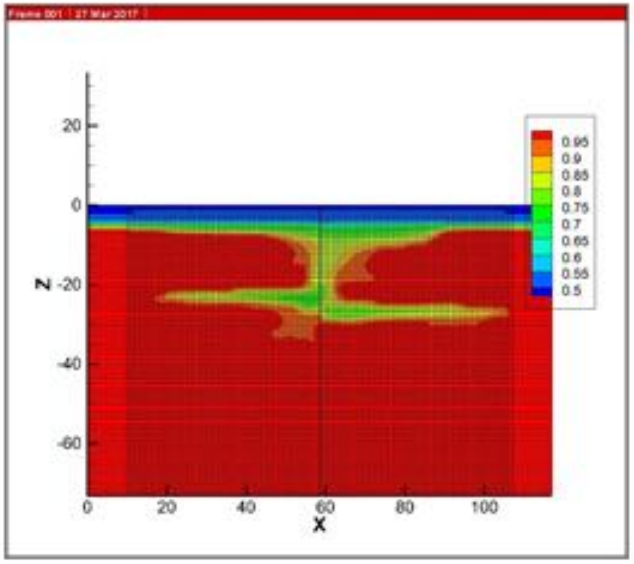
Planned piezometers and groundwater wells

CO_2 migration in the near surface

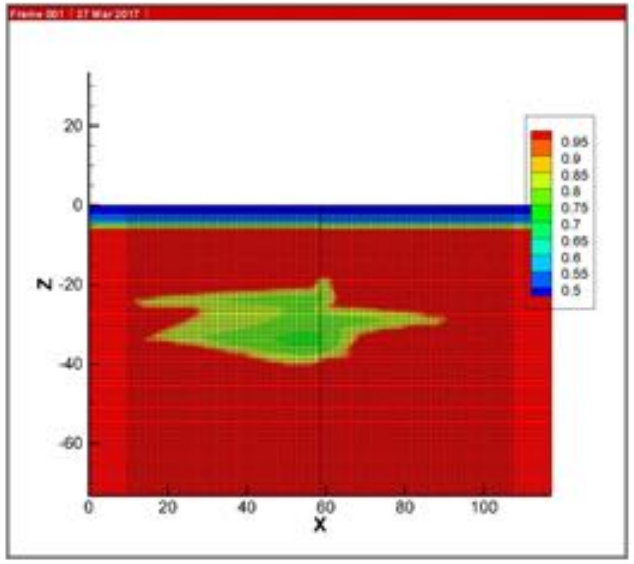
- Controlled release experiments show CO_2 can sink in soil zone (CO_2 heavier than air)
- Likely to accumulate on groundwater table
- A better handle on groundwater slope, could help predict CO_2 migration direction
- Better monitoring design around high risk features

Preliminary 2D modelling – Tough2

- Should see CO_2 migrate up fault and spread under clay layer if injection is in high permeability facies

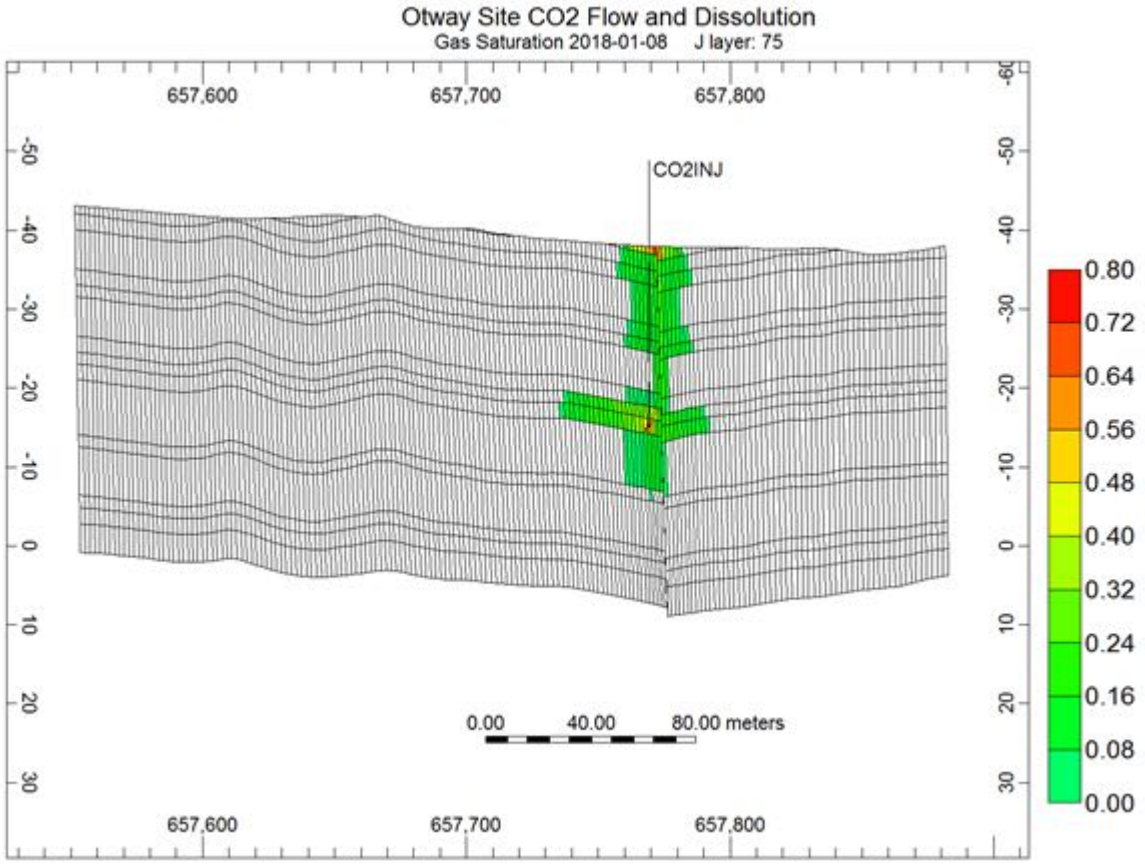


Zone 4A, 500 mD, 28m



Zone 5A, 50 mD, 32m

Preliminary modelling using - GEM



Dynamic Modelling

- Initial modelling suggests it is not easy to have CO_2 migrate up a fault
- Fault models are 'blocky' but CO_2 migration up a fault is likely to be more 'streaky'
- Are th ches?
- Advec
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Contingency surface fault monitoring

- If something “funny” is being picked up in the reservoir, need to be able to ramp up monitoring
- Assurance monitoring vs looking for leakage
- Zone of impact is likely to be small
- Won’t know exactly where leakage will occur (e.g. may not be near a dedicated monitoring well)

Technology needs

- For contingency monitoring, need technologies that are portable, flexible, easy to install (e.g. direct push wells + cross well geophysics?)
- Super slimline tools?
- Surface based geophys techniques could be advantageous
- Image/listen for bubbles in groundwater?

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