Research gaps and technology needs for monitoring CO$_2$ leakage at faults

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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
CO₂ migration in the near surface

- Controlled release experiments show CO₂ can sink in soil zone (CO₂ heavier than air)
- Likely to accumulate on groundwater table
- A better handle on groundwater slope, could help predict CO₂ 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
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 there more realistic modelling approaches?
- Advective vs diffusive flow
- Otway site offers an opportunity to test modelling predictions
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?
Government, Industry and Research Partners
Thank you