Perspectives on gaps in CO$_2$ Storage

Jonathan Pearce

British Geological Survey

Research priorities to reduce risks and costs

- Priorities based on discussions in EERA CCS workshops and ECCSEL review
  - Emphasis and more detail on thos in delegate pack

- Facilitating Phase 2 and beyond
  - Store characterisation
  - Optimised site investigation methods
- Injectivity
- Containment
- Monitoring

Where to store?

- Need to de-risk specific storage sites to enable increased confidence by developers.
  - DECC's Storage Appraisal Project (ETI) is a good start but there is much more to do

- Timing of appraisal is crucial to ensure minimum cost deployment

- How to permit and operate stacked stores and large (open) stores?

- How to select optimal injection points in large formations

Site investigation

- What is minimum data needed to assure storage capacity?

- Predicting site behaviour (modelling)
- Relative permeabilities for target formations
- Practical evidence of impacts of heterogeneities (pilots)
- Optimise integration of high res into regional models for regional processes & improved representation of heterogeneities

Injectivity issues

- Cost-effective injection testing
  - How to test representative pore volumes for many km^2 and long periods (more than a few hours) from weeks to months
  - How to predict the size of the pressure-connected volume that is in reach of one well – especially in saline aquifers

- Pressure management & amount of water production needed

Containment issues

- Underburden can be very important

- Fault behaviour
- What's good enough to predict fault behaviour?
  - Pilot-scale tests to validate predictive capability
  - Improved microseismic data
- Fault detection (in caprocks) via hi-res seismic, image logging

- Some planned projects could begin to address these

Optimised monitoring

- High-resolution permanent seismometer arrays (ocean bottom & down well) with tomography

- Leakage detection and <u>quantification</u>
  - Integrated UAVs & permanent continuous monitoring

- Integration to improve temporal and spatial resolutions at lower costs
  - Repeatability
  - Spatial scaling and data integration

Opportunities & Collaborations

- Fault-controlled migration
  - Some field tests planned and analogue studies

- Need pilot-scale tests for optimised site investigation and injectivity

- Data from demonstrations

- ECCSEL can help with (new) research facilities

Research priorities in summary

- Site investigations to enable investment

- Fault-controlled migration

- Leakage quantification and remediation

- Optimised monitoring packages

THANKS