

Industrial clusters: Evaluating Carbon Dioxide Underground in Bunter Closures (ICECUBE)

Background

- Characterising and de-risking large saline aquifer storage sites will be key to enabling industry to scale-up and meet CCUS ambitions.
- The Bunter Sandstone Formation is a key target for several industry CCUS projects (Figure 1).
 - Three separate storage licences have been granted within the ICECUBE study region.
- Previous studies have indicated that the formation has favourable properties for large-scale CO₂ storage, however a number of uncertainties remain:
 - Regionally-applicable reservoir architecture and properties remain uncertain.
 - The extent to which the saline aquifer is hydraulically-connected – this may enable pressure interference between storage sites.
 - The aquifer appears to be open to the seabed, but understanding of the connection is poorly understood.
 - Previous gas production may have generated headroom for pressure increase, however this has not been evaluated in detail.

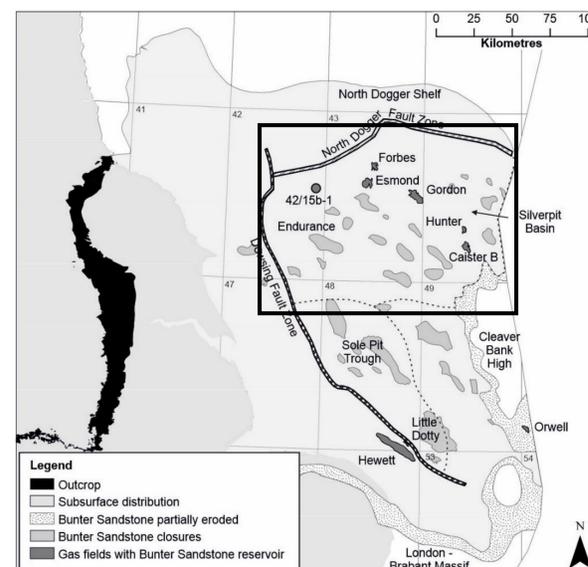


Figure 1. Location and structure of the study area. Black box indicates specific study region.

Objectives and methodology

Objectives

- Reduce risk and uncertainty related to pressure increase and propagation in the Bunter Sandstone.
- Use existing pressure data to calibrate understanding of aquifer connectivity and fluid flow parameters.
- Support industrial cluster plans for large multi-site CO₂ storage in the Bunter Sandstone.
- Inform industry, regulators and policy makers.

Methods

- Develop a new reservoir model for the study region.
- Calibrate the model using existing pressure data and history matching to historic gas production.
- Work with industry to develop understanding of future storage needs, and simulate industry CO₂ injection scenarios.
- Host a stakeholder workshop to discuss large-scale storage in the Bunter Sandstone.

Progress

Geological characterisation*

- Geological model constructed, and controls on reservoir properties investigated through petrographic (Figure 2), petrophysical and sedimentological studies (Figure 3).
- Model calibration in progress.

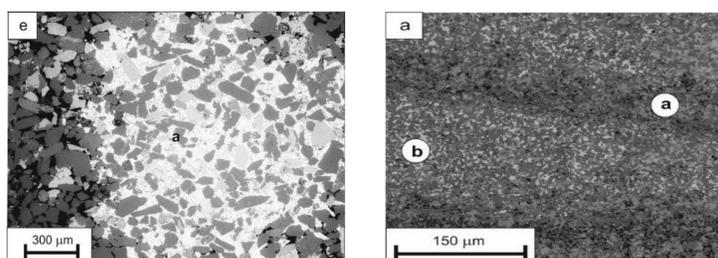


Figure 2. Selected petrographic observations from thin section analysis.

- (L) Early cements preserve uncompacted grain frameworks.
- (R) Halite and Anhydrite cement often create porosity inversion by preferentially affecting coarse sandstones.

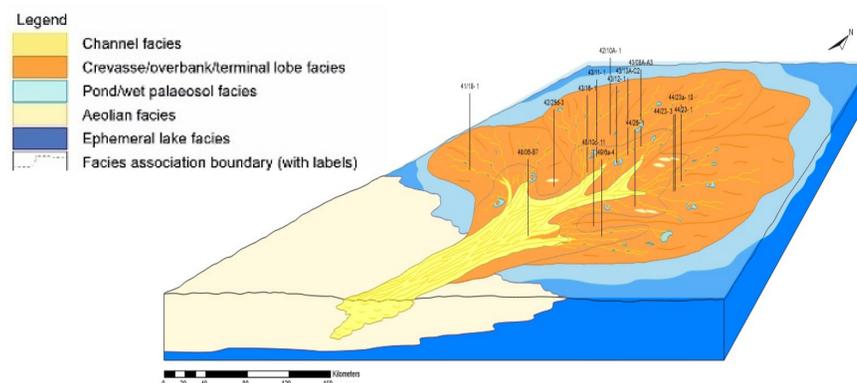


Figure 3. Depositional model based on logging of ~850 m of core from 15 wells, indicating terminal fan setting in study area.

Contact Details:

Jonathan Pearce
British Geological Survey
Keyworth, NG12 5GG
jmpe@bgs.ac.uk



British
Geological
Survey

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