



NEWSLETTER
May 2015

In This Issue...

- 3D Poroelastic Simulation of CO₂ Injection
- CONTAIN Webportal
- Meetings and Deliverables
- New Staff
- CCS in the News
- Terms and Abbreviations

CONTAIN Project Summary Carbon capture and storage (CCS) is a technology aimed at reducing carbon dioxide (CO₂) emissions from the large-scale burning of fossil fuels. CO₂ is captured during its generation at power stations, or in some large-scale industrial process, and transported by pipeline to a suitable site for underground storage. This project is aimed at:

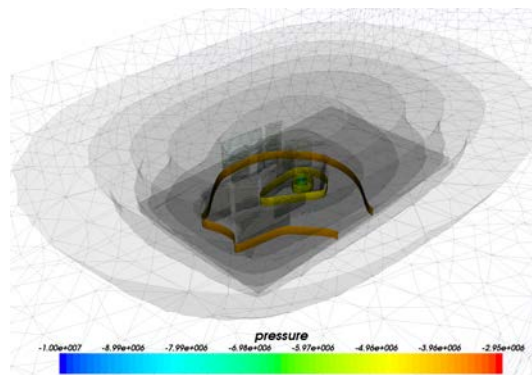
1. Understanding the mechanical effects of depletion and injection
2. Simulating injection scenarios and assessing caprock deformation
3. Disseminating the advantages and implications of CCS
4. Engaging with the public on topics of social acceptance of CCS

Work Packages (1) Impact of depletion and re-inflation on reservoir and caprock behaviour (2) Geomechanical modelling of injection/depletion scenarios (3) Social understanding and acceptance of CCS storage proposals

Investigators British Geological Survey - Dr Jon Harrington (PI) - Dr Caroline Graham - Dr Tony Milodowski - Dr Marcus Dobbs
• Imperial College - Professor Robert W Zimmerman - Dr Adriana Paluszny - Dr Saeed Salimzadeh • Cardiff University - Dr Lorraine Whitmarsh

3D Poroelastic Simulation of CO₂ Injection

[WP2] Initial *simulations* for the CONTAIN project have been completed. The impact of hydrocarbon depletion on the treatment of caprocks within performance assessment for CO₂ injection schemes.



Simulations have been performed that consider the deformation of an initially intact caprock, caused by the depletion of an underlying reservoir during oil extraction. Deformation and flow are geomechanically modelled in three dimensions using a fully coupled poroelastic model, incorporating discrete fractures and faults in the caprock. Fractures are represented explicitly in an arbitrary tetrahedral mesh. Depletion over reservoir lifetime through a single, centred well is modelled. Four layers, base, reservoir, caprock and overburden, are considered in the simulations.

Energy around the crack tips is computed to assess possible fracture growth in a number of discrete fractures and faults. Extension-driven growth is expected in fractures located away from the well. Stress intensity factors are observed to increase as depletion advances. The studies continue.

CCS Public Awareness

[WP3] Related research on attitudes to energy sources and technologies has been undertaken, including CCS and shale gas hydraulic fracturing. This has included a series of individual in-depth interviews and a nationally representative UK survey. The results have been submitted to the call for evidence from the UK Shale Gas Task Force, chaired by Lord Chris Smith. Nick Nash (Cardiff University), presented the work at the industry conference Shale World UK last month. The initial results have also been published as a Working Paper on the [research group website](#). In relation to CCS, studies have shown that public awareness is still low and attitudes are ambivalent.

CONTAIN Webportal

A project web portal has been set up and is now live at: <http://www.bgs.ac.uk/co2Contain>. It includes the description of the work packages, background of the investigators, and describes similar EPSRC projects that are part of the same call.

Project News

Project Meetings

2nd Progress Meeting

June 2015

Imperial College

2nd Executive Meeting

June 2015

Imperial College

1st Progress Meeting

April 29th, 2015

BGS, Keyworth

1st Executive Meeting

June 17th, 2014

BGS, Medical Research Council

London

Launch Meeting

October 31st, 2013

BGS, Keyworth

[WP2]

D3 Report: Experimental parameters from reservoir material testing [WP1]

Due on **Month 24** (31/9/2015)

D4: Peer review publication [WP1]

D5: Peer review publication [WP2]

D6: Peer review publication [WP3]

Other Meetings

Caroline Graham (British Geological Society) gave a **talk** entitled "CONTAIN: The Impact of Hydrocarbon Depletion on the Treatment of Caprocks within Performance Assessment for CO₂ Injection Schemes" at the UKCCSRC Cranfield Biannual 21-22 April 2015.

Deliverables

Delivered on **Month 18** (31/3/2015)

D2 Report: Initial modelling results

[Back to Contents](#)

New Staff

Saeed Salimzadeh joined the Imperial College team [WP2] as a post-doctoral research associate, and will be working on the coupled thermo-hydro-mechanical simulation of CCS. Saeed is an expert in coupled thermo-hydro geomechanics with applications to CO₂ sequestration, fractured reservoirs and hydraulic fracturing simulations, using FEM and XFEM.

Dimitrios Xenias will be joining the Cardiff team [WP3]. He will work part-time until end June, then full-time after that. Dimitrios is a social psychologist with wide-ranging expertise in social attitudes and behaviour, particularly in relation to new technologies and the environment.

[Back to Contents](#)

Terms and Abbreviations

CONTAIN — The impaCt of hydrOcarbon depletioN on the Treatment of cAprocks within performance assessment for CO₂ InjectioN schemes

CCS — Carbon Capture and Sequestration

EPSRC — Engineering and Physical Sciences Research Council

UKCCSRC — UK Carbon Capture and Storage Research Centre

CCS in the News

CO₂ levels reach monthly record
BBC - 7/5/2015

Global carbon dioxide (CO₂) concentrations have reached a new monthly record of 400 parts per million, according to scientists ... [read more](#)

Peterhead carbon capture application submitted
BBC - 30/3/2015

A planning application for a carbon capture and storage plant at Peterhead power station has been officially lodged with Aberdeenshire Council ... [read more](#)

UK CCS industry could capture 50 million of tonnes of CO₂ each

Click Green - 17/3/2015

The UK has an opportunity to build a CCS sector capable of reducing the costs of meeting its carbon targets, according to a new report by the ... [read more](#)

It's a 'PACT' - UK CCS joins international network

Energy Live News - 26/2/2015

The international carbon capture and storage (CCS) test centre network has signed up the UK's CCS research facility to bolster the ... [read more](#)

[Back to Contents](#)

This newsletter covers the period 11/2014 - 04/2015.

Links

<http://www.bgs.ac.uk/co2Contain>

<http://www.bgs.ac.uk>

<http://www.imperial.ac.uk>

<http://www.cardiff.ac.uk>

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