RISCS

research into impacts & safety in CO_2 storage

The RISCS project so far...

Since the start of the project, in January 2010, we have undertaken a number of research studies of the potential environmental impacts of CO_2 storage, in both marine and terrestrial environments, providing very interesting results. We have begun discussing our preliminary results with the scientific community through workshops, conferences and open forums.

November 2011

Issue No 2

Contact details:

Jones, David G.

British Geological Survey

Keyworth, Nottingham

NG12 5GG

+44 (0) 115 936 3576

E-mail: dgj@bgs.ac.uk

For further information:

www.riscs-CO2.eu

SEVENTH FRAMEWORK PROGRAMME

WP1 - Descriptions of Reference Environments and Scenarios

A range of reference environments and possible impact scenarios for marine and terrestrial systems were identified at an expert workshop. The baseline 'most likely' scenario is for a storage system to evolve as designed, with no leaks occurring. However, the project needs to also consider plausible CO_2 fluxes and areas that might be associated with CO_2 leakage and possible impact scenarios. These will be used to prioritise and audit work across the RISCS programme through their use in experimental design and numerical simulations. .

WP2 - Assessing and quantifying impacts and recovery in marine environment via laboratory experiments

The response & recovery of individual species and of benthic communities after exposure to elevated CO_2 concentrations have been measured in laboratory experiments in the Netherlands, Italy and the UK. Chemical, biological and physical monitoring was started at the Panarea test site in southern Italy.

The second field campaign at the Panarea test site originally planned for the spring of 2011 was postponed to July 2011 to take advantage of ship time on R/V Urania, which was provided via a successful proposal (PaCO2) to the EC Research Infrastructures project "EuroFleets" in collaboration with another FP7 project (ECO2).

Experimental CO_2 exposure system at the Plymouth Marine Laboratory.

WP3 - Assessing impacts in terrestrial environments via field experiments and observations

Grimsrud Farm, Norway and ASGARD, Nottingham, UK

These two experimental CO_2 injection sites have been commissioned to assess the impacts in soil root zones of CO_2 leakage. In Norway, experiments on the effects of CO_2 have started, both in the laboratory and in a specially constructed outdoor facility at Grimsrud farm.

Two seasons of experiments have been carried out at the University of Nottingham's ASGARD facility for RISCS on different plant species including barley, oil seed rape, beetroot, a grass/clover mix and pre-existing pasture.

Injection plot after replacement of the Ap horizons.

Natural leaking sites in Southern Europe (Greece, Italy, France)

At **Florina** (Greece), an area of natural CO_2 production from deep reservoirs and natural CO_2 seepage to the surface, groundwater samples have been geochemically characterised to determine the water quality and relationship to CO_2 concentration. Moreover, experimental protocols were established to study the impact of the CO_2 on vegetation due to irrigating with CO_2-impacted groundwater or increased soil CO_2 concentrations.

At the other sites, **San Vittorino and Latera (Italy), Montmiral (France)**, a preliminary literature review has been conducted, examining the data available for site geology, hydrogeology, CO_2 origin and migration, and potential impacts observed in the shallow groundwater systems. Data from previous studies have been compiled including surface gas geochemistry, chemical and isotope data from groundwater.

San Vittorino—sinkhole

WP4 - Assessing impacts - numerical simulations

Work is continuing on developing models of both terrestrial and marine systems that will allow us to characterise the dispersion and impact of a range of possible leakage scenarios. A full description has been produced of the currently-available terrestrial models for relevant near-surface processes and the transport of carbon in the soil-plant system. These provide the basis for the required terrestrial systems model. Future refinements that will describe plant responses have been identified. Similarly the marine systems models are being developed to better mimic the effects of excess CO_2 and models of CO_2 dispersion in seawater, on fine scales, are being developed separately. Finally, a literature review of CO_2 impacts on marine species was performed in order to develop a Species Sensitivity Distribution.

WP5 - Research Integration and Communication

The 1st version of the **Guide for Impacts Appraisal** is now completed and available for project partners only on the RISCS website. The Guide's intended readership will be industrial, policy maker and regulator stakeholders. Activities for gaining input on stakeholders' perspectives and information needs have been initiated. A questionnaire for stakeholders has been developed as well as a contact database of targeted stakeholders for the communication activities of the project.

Communication of the RISCS project to the scientific community is also an important part of the project and will continue throughout its lifetime (see below). An article providing an overview of the RISCS project has been published in the ENeRG Newsletter no. 23 (http://www.energnet.eu/issue23.pdf). Links have been made with other projects studying potential impacts of CO_2 both in Europe and other parts of the world.

RISCS goes public

- **CO_2GeoNet Venice open forum 2011** *(date & place: 9th - 11th May 2011, San Servolo Island, Venice, Italy)*

RISCS partners presented early results from the project and held a dedicated workshop with stakeholders to discuss the 'guide for impacts appraisal'.

  * *"Assessing impacts in terrestrial environments - results from the RISCS project"* - David Jones, CO2GeoNet-BGS
  * *"Assessing impacts in marine environments - results from the RISCS project"* - Cinzia de Vittor, CO2GeoNet-OGS
  * *"Building a guide for impacts appraisal: proposals and suggestions"*

- **CO_2Net annual seminar** *(date & place: 24th - 26th May 2011, London, UK)* - www.co2net.eu

BGS gave an overview of the project and a summary of the early results from laboratory experiments and field observations

- **6th Trondheim CCS conference, Norway** *(date & place: 14th - 16th June 2011, Trondheim, Norway)*
  * *RISCS: Research into Impacts and Safety in CO_2 Storage – an overview of the project and early progress*
    Poster presentation prepared by BGS and presented by Quintessa at the 6th Trondheim CCS conference in Norway
  * *Definition of Hypothetical Impact Scenarios for CO_2 Storage Sites: An Input to the RISCS Project*
    Quintessa presented a poster at the 6th Trondheim CCS conference in Norway

* *Influence of CO_2 delectability thresholds and remediation response time on surface leakage rate*
  Presentation by Sintef at the 6th Trondheim CCS conference

(More information at the website of the RISCS project)

Coming up next...

- **EAGE/SES, 8-10 November 2011, Valencia, Spain**
  Assessing Impacts of CO_2 Leakage on the Ecosystem - An Overview and Early Results from the RISCS Project

- **AGU Fall meeting, 5-9 December 2011, San Francisco, California, USA**
  Effects of elevated CO_2 on microbial communities in near surface environments