Characterisation of a CO₂ geological storage site

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SPEAKERS

Karen Kirk, BSc, Geologist, BGS – Decarbonisation and Resource Management

Stéphane Polteau, PhD, Research Scientist, IFE – Reservoir Technology

Q&A session chaired by Valentina Volpi and Federica Donda - OGS
Careful site characterisation is critical for successful geologic sequestration of CO₂, especially for sequestration in aquifers that have not been previously used for other purposes. Traditional site characterisation techniques consists of integrated analysis of geophysical data, well logging measurements, core analyses, and dynamic modelling. They are all addressed to ensure a safe and long living storage, targeted also to risk reduction. Particular attention is dedicated to the evaluation of the capacity and the injectivity, strongly influenced also by the fluid connectivity of the pore space within the storage formations. In this webinar two scientists will introduce the audience to state-of-the-art technologies for identifying and characterising the geological storage site. The speakers will present examples from current research and explain the capabilities of BGS and IFE’s ECCSEL laboratory facilities.

Risk assessment led site characterisation CO₂ injection into storage sites may impact on the surrounding geological strata, nearby potential storage sites and other subsurface operations (e.g. hydrocarbon extraction). Successful storage operations require focussed site characterisation targeted at risk reduction, demonstrating that storage sites have sufficient capacity, suitable properties and sufficient injectivity to receive the expected rate of supplied CO₂. Site characterisation also assists in demonstrating that the site will perform effectively and safely. The BGS ECCSEL laboratory facilities can provide experimental facilities to assist in testing some of the key parameters for storage site characterisation.

Characterization of Fluid Connectivity of Carbon Storage Sites using Strontium Isotopes

The aim of this contribution is to show how geochemistry can help pinpoint the precise location and time-dependent behavior of low-permeability barrier in reservoirs. Here, we use the SrRSA (Strontium Residual Salt Analysis) method to measure the $^{86}\text{Sr}/^{87}\text{Sr}$ ratio in the salt residue that precipitated in the pore space after the core dried out. The $^{86}\text{Sr}/^{87}\text{Sr}$ is a natural tracer because the ratio is virtually not affected by mass fractionation but is instead interpreted as representing the degree of equilibration through the slow process of diffusion and mixing. Therefore, the SrRSA data amplify heterogeneities when compared to pressure trends that equilibrate faster than diffusion. Practically, the SrRSA data patterns are used to characterize the vertical connectivity within one well, or both lateral and vertical connectivity between several wells. When carried out during the early phase of field development planning, the SrRSA method is a very useful tool to help optimize the location of wells and injection points in carbon storage sites.

FOR FURTHER INFORMATION VISIT OUR WEBSITE:

WWW.ECCSEL.ORG

HTTPS://ECCSEL.ORG/ABOUT/ECCSELERATE/

ECCSEL ERIC (European Research Infrastructure Consortium) was established in June 2017 as a permanent pan-European distributed research infrastructure, with the main objective of enhancing European science, technology development, innovation and education in the field of CCUS, in order to combat climate change.

ECCSELERATE project is aimed at increasing the accessibility to the excellent network of facilities already established in ECCSEL ERIC for a wider user group, part of the research and industrial community.
KEYNOTE SPEAKERS

Karen Kirk is a geologist at the British Geological Survey (BGS) working in the Decarbonisation and Resource Management challenge. She has primarily worked on projects focused on the geological storage of carbon dioxide since 2001. Her experience is mainly in assessing sites for their storage capacity and suitability to store CO2 as well as risk assessment as part of site characterisation. She holds a BSc Single Honours Geology degree from Derby University, UK.

Stephane Polteauis is a senior research scientist in the Reservoir Department at IFE, where he has been working on the interpretation of strontium isotope data in terms of reservoir characterization. He is also involved in a wide range of research topics mostly related to fluid migration in sedimentary basins, with a special interest in developing tools to detect natural seepage of hydrocarbons for exploration. He holds a M.Sc. and PhD in Economic/Exploration Geology from Rhodes University in South Africa on the Snowball Earth and Great Oxidation Event in the Early Proterozoic.

WHAT IS CCUS?

Carbon capture, utilisation and storage, or CCUS, is an important emissions reduction approach that can be applied across the energy system, in both power generation and industrial sectors. CCUS encompasses methods and technologies to remove CO2 from the flue gas and from the atmosphere, followed by recycling the CO2 for utilization and determining safe and permanent storage options:

- Capture technologies allow the separation of CO2 from gases produced in electricity generation and industrial processes.
- After capture, carbon dioxide must be transported to the storage or utilization site. CO2 is an inert gas and can be easily handled and transported in high-pressure pipelines. Alternatively, it can be transported in industrial tanks by ship, rail and truck.
- There are several possibilities for long-term CO2 storage in safe conditions. Generally, CO2 is stored in carefully selected geological rock formations that are typically located several kilometres below the earth’s surface.
- Utilization technologies allow to use CO2 to make valuable products, such as clean fuels, building materials or consumer goods. A clear example of circular economy, where the CO2 becomes a raw material rather than a waste by-product.