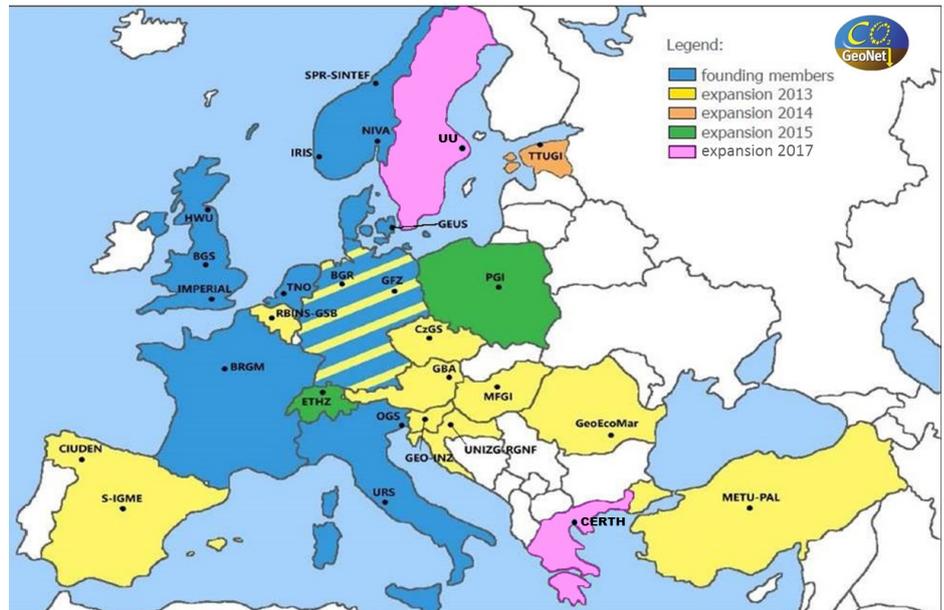




New Members enhance CO₂GeoNet

CO₂GeoNet continues to expand both in terms of geographical coverage and expertise, benefitting Members and the scientific community where CCS is viewed as a key part of a low carbon future. CO₂GeoNet is strengthened by the addition of two new Members: the *Centre for Research & Technology Hellas (CERTH)* from Greece and *Uppsala University (UU)* from Sweden, who were unanimously accepted at the 2017 CO₂GeoNet General Assembly.

These new Members bring new skills and significant expertise in geological storage of CO₂ which will be of benefit to the research, training, scientific advice, information and communication activities carried out by the Association. These new Members also add two new countries to the Association's portfolio which now comprises 28 Members from 21 countries. CERTH is already working with CO₂GeoNet



Members through the ECCSEL project. Uppsala University Department of Earth Sciences, has previously worked with CO₂GeoNet Members on projects such as CO₂CARE and CO₂Sink. The

new Members give a brief introduction to their CCS related activities on page 4 of the newsletter.

Ceri J. Vincent, BGS, UK

Editorial

An integral approach to CCS implementation



Solving the problem of climate change requires an integral approach from scientists, technology providers and decision makers; all available mitigation measures are required and need to be implemented in a concerted manner to reach significant reductions in emissions by the middle of this century.

Governments and industry have important roles to play in initiating and developing a market for CCS. Industry is expecting the national authorities to create the conditions for such a market. Vice versa, governments expect industry to invest in CCS projects. These singular positions do not help in creating momentum for the large-scale implementation of CCS: partnerships of public and private organisations should be set up to drive CCS implementation forward.

The communities of renewables, clean fossil power and low-carbon industry tend to focus on the merits of their own sector and their own technologies. An integral and holistic view of these sectors is necessary to come up with successful solutions for mitigating climate change.

In my previous editorial I emphasised the importance of reducing geoscientific uncertainties to enable positive investment decisions for CCS. This implies that geoscientists should work together with economists and lawyers in creating more 'added-value' to their research and enabling decisions for the implementation of CCS.

Ton Wildenborg, President CO₂GeoNet

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- New ECCSEL infrastructure now available to researchers
- Presentation of new member institutes

Sharing and discovering scientific papers via the Mendeley Repository

Figure 1. Search for CO₂GeoNet Group

CO₂GeoNet draws together more than 300 multidisciplinary experts from 28 leading research institutes located in 21 European countries. The Association is recognised as a European scientific authority, dealing with all aspects of geological storage of CO₂, engaged in enabling the safe and efficient deployment of CO₂ Capture and Storage (CCS) technology in order to mitigate climate change and ocean acidification.

CO₂GeoNet is a vibrant research community as demonstrated by the numerous scientific papers written by Members. The range of topics that is covered by the researchers that make up CO₂GeoNet is so broad that it is impossible to mention all the titles and topics in this article. The published papers and reports cover a huge range of topics from storage potential assessments to geochemical modelling and seismic monitoring to mineral carbonation and many more. A platform is required to facilitate sharing and access

to material for scientists whose aim is to create a carbon-neutral future: Mendeley has all the tools we need to provide a cloud-based repository. It can be used to share publications, making it easy to share research with CO₂GeoNet Members and the wider scientific community.

There are currently 870 different papers in the repository that are also listed by ScienceDirect (which is the world's largest electronic collection of science, technology, and medicine full text and bibliographic information founded by Elsevier). Including all co-authors, the total number of researchers reaches over 1770 scientists working in the various disciplines of CCS.

In order to utilise the database, the user is required to create a free Mendeley account by completing the form at www.mendeley.com/join. Then, searching for 'CO₂GeoNet' in the Groups section of the search area will allow the

user to access all papers authored by CO₂GeoNet Members (see Fig. 1).

We invite you to follow the group by clicking the "Follow" button. This will ensure that you receive information about new additions as they are uploaded to the database. You may view all the publications available in the "Documents" section.

The easiest way to use the Mendeley database is to access the desktop software (see Fig. 2) which can be downloaded from the Mendeley Website. This software allows the user to search through documents, see all the authors, export citations etc.

Another option is to visit the CO₂GeoNet web page: www.co2geonet.com/resources where you may see the latest additions and search through the documents very easily.

Çağlar SINAYUÇ, METU-PAL, Turkey

Figure 2. Mendeley Desktop

The screenshot shows the Mendeley Desktop application. The main window displays a library for the 'CO₂GeoNet' group, owned by 'CO₂ GeoNet'. The 'Documents' tab is active, showing a list of 870 documents. The table below represents the visible portion of this list:

Authors	Title	Year	Published In	Ad
Abbasov, A; Mer...	Experimental investigation of carbon dioxide injection effects o...	2016	Journal of Natural Gas S...	30
Adam, H; Jones, ...	Techniques for surface gas monitoring at onshore CO ₂ stora...	2009	1st International Greenhouse ...	03
Adams, E; Akai, ...	International field experiment on ocean carbon sequestration	2002	Environmental Science and ...	29
Adeyinka, A; Pick...	Numerical simulation of CO ₂ s...	2013	75th European Association o...	03
Agada, S; Geige...	Wettability, hysteresis and fracture-matrix interaction during CO ₂ EO...	2016	International Journal of Gr...	03
Aker, E; Bjørnar...	SUCCESS: Subsurface CO ₂ storage - Critical elements and su...	2011	10th International ...	29
Akervoll, I; Berg...	CO ₂ EOR from representative North Sea Oil reservoirs	2010	SPE International ...	29
Akervoll, I; Linde...	Feasibility of Reproduction of Stored CO ₂ from the Utsira Form...	2009	9th International Conference o...	29
Akhurst, Maxine; ...	Risk Assessment-Led Characterisation of the SiteChar ...	2015	Oil & Gas Science and ...	23
Al-Quraini, A; So...	Heavy oil recovery by liquid CO ₂ /water injection (SPE-107163)	2007	69th European Association o...	03
Alemanni, A; Batt...	A three dimensional representation of the fracture network of a CO ₂ r...	2011	10th International ...	26
Alemanni, A; Batt...	A three dimensional representation of the fracture network of a CO ₂ r...	2010	72nd European Association o...	26
André, Laurent; ...	Numerical modeling of fluid-rock chemical interactions at the super...	2007	Energy Conversion a...	22
André, Laurent; ...	Modeling the Geochemical Impact of an Injection of CO ₂ and Associ...	2014	Transport in Porous Media	22
André, Laurent; ...	Numerical simulations of the thermal impact of supercritical C...	2010	Transport in Porous Media	20
André, Laurent; ...	Impact of porous medium desiccation during anhydrous C...	2011	Energy Procedia	20
André, Laurent; ...	Well injectivity during CO ₂ storage operations in deep saline aquifer...	2014	International Journal of Gr...	20
Angelone, M; Ga...	Fluid geochemistry of the Sardinian Rift-Campidano Graben (Sardini...	2005	Applied Geochemistry	26

The right-hand pane shows the details of a selected document: 'Numerical modeling of fluid-rock chemical interactions at the supercritical CO₂-liquid interface during CO₂ injection into a carbonate reservoir, the Dogge...'. The authors listed are L. André, P. Audigane, M. Azaroual et al. The document is a 'Journal Article' from 'Energy Conversion and Management', Volume 48, Issue 6, Pages 1782-1797, published in 2007. The abstract describes a project of geological CO₂ storage in the deep Dogger aquifer in the Paris Basin (France) under development, where investigations need to be carried out on reservoir behavior when subjected to physical, chemical and mechanical perturbations induced by CO₂ injections.



Czech - Norwegian joint project REPP-CO₂



As we all know, storing CO₂ is an essential part of reaching the goals set by the Paris Agreement. Commercial utilisation of CO₂ is one of the mechanisms with potential to create a business case for the storage process. Out of the different utilisation scenarios available at the moment CO₂-EHR (enhanced hydrocarbon, i.e. oil

or gas, recovery) is the only one capable of continuously utilising large volumes of carbon dioxide, creating a revenue stream and allowing smooth transition into permanent storage and deployment of large scale CCUS (carbon capture, utilisation and storage).

CO₂ is a well-known and efficient EHR

agent (see, for example, the IEA report 'Storing CO₂ through Enhanced Oil Recovery' (https://www.iea.org/publications/insights/insightpublications/Storing_CO2_through_Enhanced_Oil_Recovery.pdf) and by combining it with permanent storage, carbon-neutral or even carbon-negative oil production can be targeted. Simulations of CO₂-EOR combined with storage carried out under the REPP-CO₂ project (Czech-Norwegian collaboration sponsored by Norway grants, see www.geology.cz/repp-co2/english for more information) showed that the CO₂ storage potential in LBr-1, an abandoned oil field in the Vienna Basin, could surpass the volume generated in historical and predicted oil recovery periods. The work to optimise the process continues under the H2020 ENOS project (ENabling Onshore Storage in Europe, see <http://www.enos-project.eu/> for more information). Project partners will assess how CO₂-EHR could simultaneously create a business case enabling permanent storage and compensate (or exceed) emissions caused by hydrocarbon production.

Czech and Norwegian researchers discussing local geology on the LBr-1 site in the Czech Republic – the locality where CO₂-driven Enhanced Oil Recovery within the prepared CO₂ storage pilot project was investigated through REPP-CO₂ (photo courtesy V. Hladik)



*Roman Berenblyum, IRIS, Norway
Vit Hladik, CGS, Czech Republic*

Erasmus Plus (Erasmus+) is the new programme combining all of the EU's current schemes for education, training, youth work and sport, which was launched in January 2014. The programme provides mobility opportunities for the Bachelor, Master and PhD students across Europe. Last year, some CO₂GeoNet university members (Sapienza University, MetuPal University, Tallin University, University of Zagreb) signed up to the Erasmus bilateral agreement, to support mobility

ERASMUS Agreement between university members of CO₂GeoNet

of students from their institutes and to strengthen the relationship among CO₂GeoNet partners. Future plans are to activate the agreement amongst all the universities involved in the Association. Erasmus+ is also funding young researcher mobility with the Erasmus traineeship programme supporting brief

periods (up to 3 months) of training at research institutes, SMEs and public organisations. Previously, CO₂GeoNet Members have utilised this opportunity for researcher exchange to the benefit of Members and Institutes alike.

Sabina Bigi, Sapienza, Italy

CSLF regional stakeholder champion for Europe

CO₂GeoNet and the UK Carbon Capture and Storage Association (CCSA) are joining forces in the role of European region Stakeholder Champion for the Carbon Sequestration Leadership Forum (CSLF). Working together, CO₂GeoNet and CCSA will collate stakeholder views to accurately reflect the

diverse stakeholder needs that must be met to achieve successful development and deployment of CCS in the European region. Views will be collated via a standardised questionnaire and a one-day stakeholder meeting during September in Brussels. Input received will be synthesised into a set

of recommendations from the European region for input to the 2017 CSLF Ministerial Meeting.

To contribute to this survey, please email info@co2geonet.com with 'CSLF European stakeholder questionnaire' in the subject line and we will be glad to provide you with the questionnaire when it is available.

Ceri J. Vincent, BGS, UK



ECCSEL National Info Days and capacity building activities – the Italian contribution

The mission of ECCSEL is to establish, operate and provide access to a world-class distributed Research Infrastructure (RI) devoted to second and third generation CCS technologies, with the aim to enable low to zero CO₂ emissions from industry and power generation.

All nine country members of ECCSEL are organising National Info Days to encourage access to ECCSEL facilities and to promote the RI implementation towards the ERIC (European Research Infrastructure

Consortium). The first Italian National Info Day was held in Rome, on 2nd March 2017, organised by OGS, the ECCSEL Italian National Node. The Italian facilities accessible through the ECCSEL Transnational Access Programme were presented with the help of Sotacarbo, Italian partner in ECCSEL, including the new natural laboratories of Panarea and Latera.

On 29th March OGS, responsible for the capacity building WP in ECCSEL, organised

the "ECCSEL Training Course on research infrastructures for CO₂ storage: specific focus on monitoring and natural laboratories". The event was kindly hosted by Sapienza University, OGS partner in the ECCSEL NatLab Italy project, and saw some key note speakers from NTNU, Sapienza University and OGS.

*Michela Vellico, OGS, Italy
Cinzia De Vittor, OGS, Italy
Sabina Bigi, Sapienza, Italy*

CO₂GeoNet is expanding Presentation of new member institutes (5th round of applications)

Centre for Research and Technology Hellas (CERTH)



CERTH
CENTRE FOR
RESEARCH & TECHNOLOGY
HELLAS

The Centre for Research and Technology Hellas (CERTH) is the largest research centre in Northern Greece employing around 700 highly qualified scientists. CERTH's annual turn-over for 2014 was around 20 million Euros. CERTH, in collaboration with other research institutes, is active in fundamental and applied research focusing on CCS and was ranked amongst the top 20 Research Centres in Europe in FP7 competitive grant participation for the period 2007-2012. Our main ambitions are the development and implementation of "cleaner" coal combustion technologies and the development of innovative environmental management methods, focussing on CCS technologies and the use of alternative fuel sources, such as coal gasification and hydrogen production. CERTH's longstanding experience in the field derives from the realisation of numerous EU and national energy-related projects, in collaboration with Europe's leading power producers. Major CCS projects include RISCS, R&Dialogue, Novelties on CCS, UCG-CO₂, ECCSEL INFRADEV-3 etc. (funded under FP7 and Research Fund for Coal and Steel).

Uppsala University - Department of Earth Sciences (UU)



UPPSALA
UNIVERSITET

Uppsala University (UU) was founded in 1477 and is therefore the oldest university in Sweden. It has been ranked amongst the top 100 universities in the world in three major international university ranking league tables for several years. Cutting edge research into geological storage of CO₂ is carried out by the Department of Earth Sciences, whose main areas of interest are focused on hydrogeology and geophysics. Over recent years, UU has been actively involved in EU CO₂ related FP7 projects including MUSTANG, PANACEA, CO₂QUEST, TRUST, CO₂SINK and CO₂CARE, taking on a leadership role in several of these projects. As part of FP7 research activities, UU has been an active partner in establishing the CO₂ injection site at Heletz in Israel, providing scientific research to support the experiments carried out at the injection site. UU has also been active in several CO₂ related projects and initiatives in the Baltic Sea region.



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