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8th UK Geothermal Symposium

17th November 2021

The Geological Society, Burlington House, Piccadilly London and Virtual

Abstract Book



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For further information please contact:

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8th UK Geothermal Symposium

17th November 2021

Hybrid Conference, The Geological Society and Zoom, BST

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Programme

Day One	
09.00	Registration
09.30	Welcome
Session One: UK Industry Updates	
09.40	In person United Downs: Power, Heat and Rum Ryan Law, <i>Geothermal Engineering Ltd</i>
10.00	In person Geothermal in the garden of Eden Roy Baria, <i>EGS Energy Ltd</i>
10.20	In person Upscaling the geothermal opportunity through technical and commercial evaluation Dave Waters, <i>Paetoro Consulting UK Ltd</i>
10.40	Virtual Minewater project (Hebburn Minewater Project) Bobo Ng, <i>North East LEP</i>
11.00	BREAK
Session Two: Derisking Geothermal	
11.20	In person De-risking the geothermal resource: overcoming geological uncertainty Gioia Falcone, <i>University of Glasgow</i>
11.40	In person De-risking the drilling process: planning the drilling programme Kevin Mallin, <i>GeoLorn</i>
12.00	Virtual De-risking deep geothermal commercial delivery: financing and selling geothermal energy Joerg Baumgaertner, <i>BESTEC</i>
12.20	Virtual An alternative approach: Eavor Loop closed-loop design Robert Winsloe, <i>Eavor</i>
12.40	LUNCH
Session Three: UK Geothermal Research	
14.00	Virtual Updates from the mine water geothermal UK Geoenergy Observatory in Glasgow Alison Monaghan, <i>BGS</i>
14.15	Virtual HotScot: creating an industry of minewater thermal Zoe Shipton, <i>Strathclyde University</i>
14.30	Virtual Decarbonising the petroleum industry with geothermal Alison Auld, <i>SHIFT Geothermal</i>

14.45	Virtual Northern Ireland Sedimentary aquifers Rob Raine, <i>GSN/</i>
15.00	In person The Geo-Urban Project James McAteer, <i>Gavin & Doherty Geosolutions</i>
15.15	BREAK
	Session Four: Policy & regulation Discussion Panel
15.30	Discussion of the policy and regulatory framework in the UK Helen Goodman, <i>Durham Energy Institute</i> Corinna Abessar, <i>BGS</i> Richard Day, <i>Eden Geothermal Limited Chairman</i> Sarah Blake, <i>Geological Society of Ireland (GSI)</i>
16.20	Closing remarks David Townsend
16.30	Energy Group Hybrid Awards 16.30pm – Introduction from Chair 16.40pm – Energy Group Medal Award presented 16.45pm – Reply presentation 16.55pm – Early Career Award Presented 17.00pm – Reply presentation 17.10pm - Closing remarks
17.15	Drinks reception in Lower Library
18.15	End of event



Wednesday 17th November 2021

Session One: UK Industry Updates

Upscaling the geothermal opportunity through technical and commercial evaluation

Dave Waters, *Paetoro Consulting UK Ltd*

An important issue for geothermal energy is commercial risk relative to other low-carbon energy competitors like wind and solar. The nature of geothermal energy, particularly heat, requires a proximal market. Accessing a new geothermal resource involves not only drilling expense but also geological, drilling, and operational risks that competing resource types do not bear.

Pre-drill opportunities to reduce these risks are limited. Variability in subsurface resource, market proximity and customer risk aversion are unique to each location, so success in one place does not ensure success elsewhere. This makes investment harder to attract and technical and commercial de-risking strategies are therefore critical. Yet the large, long-lived, low land-footprint, baseload energy supply that can be delivered in a success case is attractive to certain customers.

Our analysis presents an approach to upscale the geothermal opportunity through “favourability mapping” that integrates both geological factors and concurrent commercial analysis on a regional level to highlight opportunities for efficient investment. Complementarity and competition from other energy sources are considered. This early project upscaling focus can save time, increase profit-margins, and reduce risk in geothermal project portfolios.

Minewater project (Hebburn Minewater Project)

Bobo Ng, *North East LEP*

The presentation will cover the development of Hebburn Minewater Project, one of the first EU/ ERDF funded mine energy heat network project extracting heat from the abandoned flooded coal mines at Hebburn Colliery. Two boreholes will be drilled into the ground to abstract and discharge heat from two different coal mine workings between 200m to 300m below ground. A brand-new water source heat pump plant is designed to operate in conjunction with an existing oversized Combined Heat and Power (CHP) and gas fired boiler plants from one of the connected buildings to the heat network. Both existing gas-fired plants are expected to be replaced by another water source heat pump at the end their life expectancy, as the heat network expanded. Results from the optimisation modelling work indicates a dominant CHP heat contribution reduces energy costs significantly but also increases carbon emission whereas the opposite occurs with a dominant heat pump heat contribution. A numerical model is created for the network owner to continue reviewing and optimising the heating plant control strategy to meet the future heat demand and carbon reduction targets.

Session Two: Derisking Geothermal

De-risking the *geothermal resource: overcoming geological uncertainty*

Gioia Falcone, University of Glasgow

Geothermal energy plays a key role towards the decarbonisation of the energy sector. While most of the conventional hydrothermal resources have already been discovered and exploited across continents, the greatest potential for future geothermal energy production and thermal energy storage lies in unconventional settings.

This presentation will discuss the definition of 'chance of success' and 'risk' in conventional and unconventional geothermal settings,

De-risking the drilling process: planning the drilling programme

Kevin Mallin, GeoLorn

Ten minutes of thought-provoking comments and observations, that will undoubtedly lead to a very interesting debate amongst all the delegates, virtual and present.

The aim of the presentation is to get people to think about project risks that are associated with deep geothermal drilling operations, how best to deal with them and how we can collectively manage them more effectively.

De-risking deep geothermal commercial delivery: financing and selling geothermal energy

Joerg Baumgaertner, BESTEC

This presentation provides a brief description of the technical challenges associated with developing and operating deep geothermal power projects and describes possible approaches to address them.

Geothermal power projects have very unique development timelines that are substantially different from most, if not all, other renewable energy technologies. A greenfield project typically starts with several years of exploration and drilling, followed by a comparably brief power plant construction period, and then several decades of operation. This timeline creates unique risks and challenges for the geothermal industry.

Geothermal power plants can produce baseload electricity; 24 hours a day, 7 days a week. As a result, geothermal power plants have a high-capacity factor, demonstrating a level of consistency and reliability not found in other renewable technologies. However, geothermal resources vary a lot at depth i.e temperature, flow rate and type of fluid or steam composition. Therefore, each project is unique to some degree and has its specific challenges, which the industry has to address. This complexity can only be handled successfully if a structured operational approach exists which offers established technical solutions, thus creating confidence in the technology.

Geothermal wells have been found to be an extremely reliable resource of heat energy and in fact it operates more efficiently if the wells can be allowed to run continuously. Therefore, proper maintenance and operation of geothermal wells is vitally important in achieving success for a geothermal project. Based on over 20 years of worldwide experience in this field, the presentation will also give a brief insight in the challenges faced while operating geothermal power plants.

An alternative approach: Eavor Loop closed-loop design

Robert Winsloe, *Eavor*

At sufficient depth, geothermal energy is available everywhere. And yet it still only accounts for a tiny fraction of the world's energy supply. Fortunately, a range of proven and emerging technologies (many of which are directly derived from the oil and gas sector) now make geothermal energy development possible anywhere. This paper will briefly review these technologies and then focus on the potential role of closed-loop geothermal both as a risk mitigation strategy for geothermal development and as a solution in its own right.

Session Three: UK Geothermal Research

Updates from the mine water geothermal UK Geoenergy Observatory in Glasgow

Alison Monaghan, *BGS*

The UK Geoenergy Observatory in Glasgow is an at-scale 'underground laboratory' of 12 boreholes, surface monitoring equipment and open data for investigating shallow, low-temperature mine water heat energy, heat storage resources, subsurface processes and environmental change. Boreholes were drilled in 2018-2019 and a wide range of data is available including results of initial hydrogeological testing and environmental baseline monitoring. A publicly funded NERC facility, the Observatory is open for academic and commercial use. It has started to enable testing and monitoring for resource characterisation and long term utilisation of mine water heat, and environmental management. This talk will give an update on the capability available for research and innovation, including 'geothermal infrastructure' currently being installed.

HotScot: creating an industry of minewater thermal

Zoe Shipton, *Strathclyde University*

The HotScot industry-academic consortium was formed to transform the legacy of Scotland's coal mining, which drove the first industrial revolution, into an asset for the 'green industrial revolution'. Minewater geothermal heating utilises water at 12-20 degrees C from flooded mines, upgraded through heat pumps, to heat homes and businesses. HotScot brings together world-leading academics public sector organisations and supply-chain companies from across relevant disciplines from appraisal of potential minewater schemes through to delivery of heating to homes and businesses: including geoscience; heat pumps, batteries, networks and control systems; AI and data analytics; building retrofit; business; and public engagement. HotScot members are conducting R&D to de-risk the resource, drive down costs and to address technical, commercial and societal barriers to adoption, in parallel to developing minewater schemes across the Central Belt. We are also jointly exploring the potential for energy storage in mines: the waste heat 'resource' is estimated as 1,677GMhr in Scotland). So there are significant opportunities if the technologies can be developed to meet the challenges of de-risking and reducing costs for the balancing of heat and cooling demands, and associated electrical demand. Approximately 80% of the most deprived communities in Scotland's Central belt live above mines: this resource presents an opportunity to bring development and jobs to these areas as well as addressing energy poverty.

Decarbonising the petroleum industry with geothermal

Alison Auld, *SHIFT Geothermal*

The UK has benefited hugely from the discovery of gas and then oil on its continental shelf in the 1960s. Employment, energy security and the flood of income from taxation

of petroleum production have contributed to the UK being a significant economic power for decades.

Now the production of petroleum is declining due to depleted reserves, as is tolerance for oil and gas fuelling our society in the face of climate change. So, the North Sea industry is closing and the subsequent detrimental impacts on employment, energy security and cost to UK tax payer are emerging.

Can geothermal energy play a role in creating a net-zero emission North Sea? We will examine the resources, skills and knowledge contained within the North Sea and its industry to offer a different future, one of high skill, high employment and geothermal energy recovery.

Northern Ireland Sedimentary aquifers

Rob Raine, *GSI*

Sedimentary aquifers across Northern Ireland have great potential for deep geothermal prospects. Northern Ireland has a geothermal gradient higher than many parts of Britain and Ireland and there are a number of sedimentary basins present across Northern Ireland, with modelled thicknesses of sediment up to 4.5 km. Deep drilling has proven the existence of a few highly porous and permeable reservoirs of different stratigraphic ages within these basins. Despite this, the limited nature of deep drilling and seismic acquisition in Northern Ireland and the presence of thick basalts across many of the sedimentary basins hinders the development of our knowledge of these reservoirs. A holistic approach to their future study is therefore required. Our understanding of reservoirs in Northern Ireland relies on data from surface mapping and sampling around the periphery of the basins, cores from shallow boreholes and data from seismic reflection, gravity, magnetics and magnetotelluric (MT) surveys, along with information from a few deep exploration boreholes. Sedimentary deep geothermal reservoirs from the Carboniferous, Permian and Triassic systems hold the most potential, although each have advantages and drawbacks. This talk will summarise the current state of knowledge on these reservoirs and potential opportunities for geothermal exploration and development in Northern Ireland.

GSL CODE OF CONDUCT FOR MEETINGS AND OTHER EVENTS

INTRODUCTION

The Geological Society of London is a professional and learned society, which, through its members, has a duty in the public interest to provide a safe, productive and welcoming environment for all participants and attendees of our meetings, workshops, and events regardless of age, gender, sexual orientation, gender identity, race, ethnicity, religion, disability, physical appearance, or career level.

This Code of Conduct applies to all participants in Society related activities, including, but not limited to, attendees, speakers, volunteers, exhibitors, representatives to outside bodies, and applies in all GSL activities, including ancillary meetings, events and social gatherings.

It also applies to members of the Society attending externally organised events, wherever the venue.

BEHAVIOUR

The Society values participation by all attendees at its events and wants to ensure that your experience is as constructive and professionally stimulating as possible.

Whilst the debate of scientific ideas is encouraged, participants are expected to behave in a respectful and professional manner - harassment and, or, sexist, racist, or exclusionary comments or jokes are not appropriate and will not be tolerated.

Harassment includes sustained disruption of talks or other events, inappropriate physical contact, sexual attention or innuendo, deliberate intimidation, stalking, and intrusive photography or recording of an individual without consent. It also includes discrimination or offensive comments related to age, gender identity, sexual orientation, disability, physical appearance, language, citizenship, ethnic origin, race or religion.

The Geological Society expects and requires all participants to abide by and uphold the principles of this Code of Conduct and transgressions or violations will not be tolerated.

BREACH OF THE CODE OF CONDUCT

The Society considers it unprofessional, unethical and totally unacceptable to engage in or condone any kind of discrimination or harassment, or to disregard complaints of harassment from colleagues or staff.

If an incident of proscribed conduct occurs either within or outside the Society's premises during an event, then the aggrieved person or witness to the proscribed conduct is encouraged to report it promptly to a member of staff or the event's principal organiser.

Once the Society is notified, staff or a senior organiser of the meeting will discuss the details first with the individual making the complaint, then any witnesses who have been identified, and then the alleged offender, before determining an appropriate course of action. Confidentiality will be maintained to the extent that it does not compromise the rights of others. The Society will cooperate fully with any criminal or civil investigation arising from incidents that occur during Society events.

Burlington House Fire Safety Information

If you hear the Alarm

Alarm Bells are situated throughout the building and will ring continuously for an evacuation. Do not stop to collect your personal belongings.

Leave the building via the nearest and safest exit or the exit that you are advised to by the Fire Marshal on that floor.

Fire Exits from the Geological Society Conference Rooms

Lower Library:

Exit via main reception onto Piccadilly, or via staff entrance onto the courtyard.

Lecture Theatre

Exit at front of theatre (by screen) onto Courtyard or via side door out to Piccadilly entrance or via the doors that link to the Lower Library and to the staff entrance.

Main Piccadilly Entrance

Straight out door and walk around to the Courtyard.

Close the doors when leaving a room. **DO NOT SWITCH OFF THE LIGHTS.**

Assemble in the Courtyard in front of the Royal Academy, outside the Royal Astronomical Society. Event organizers should report as soon as possible to the nearest Fire Marshal on whether all event participants have been safely evacuated.

Please do not re-enter the building except when you are advised that it is safe to do so by the Fire Brigade.

First Aid

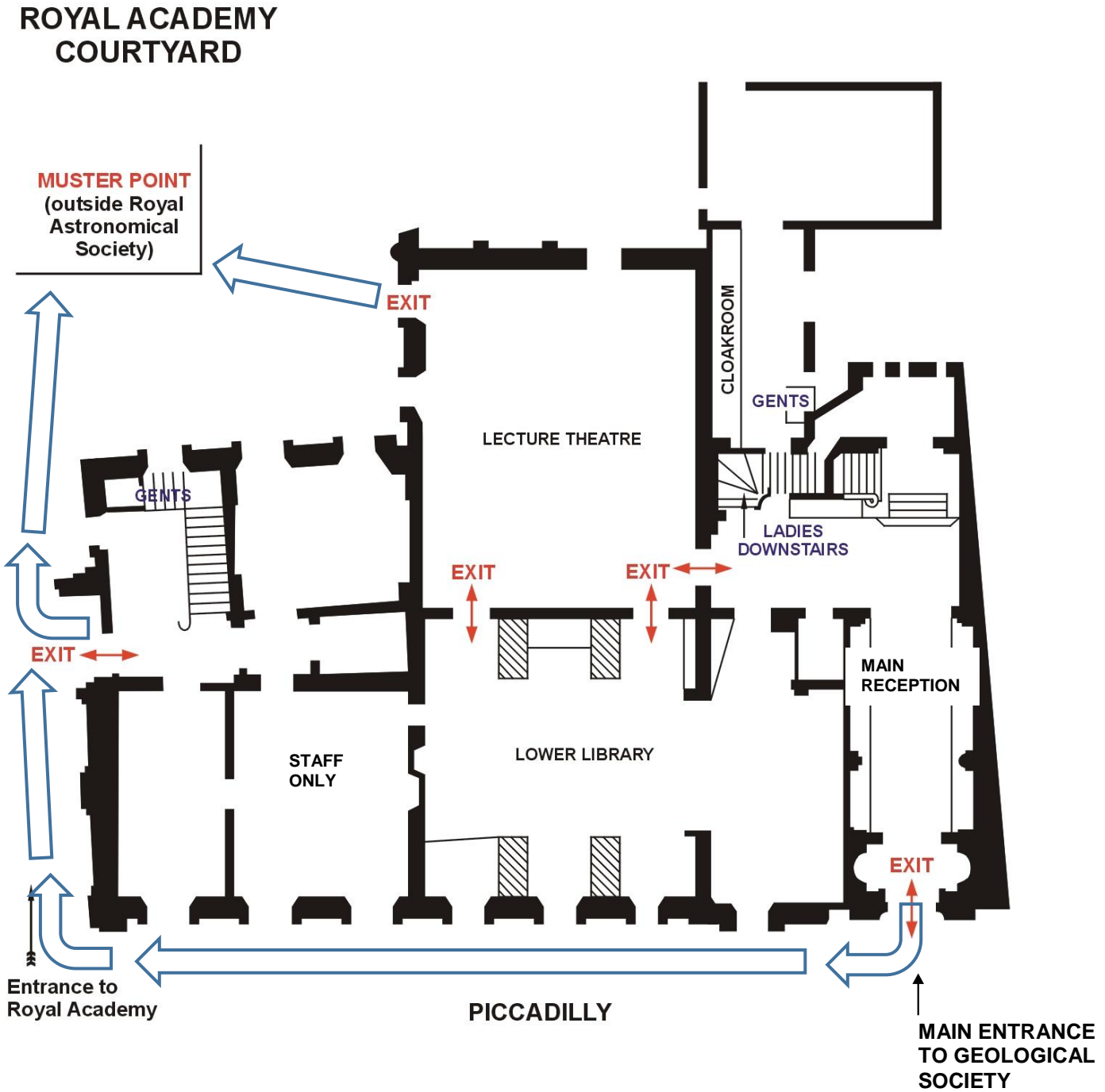
All accidents should be reported to Reception and First Aid assistance will be provided if necessary.

Facilities

The ladies toilets are situated in the basement at the bottom of the staircase outside the Lecture Theatre.

The Gents toilets are situated on the ground floor in the corridor leading to the Arthur Holmes Room.

Ground Floor Plan of the Geological Society, Burlington House, Piccadilly



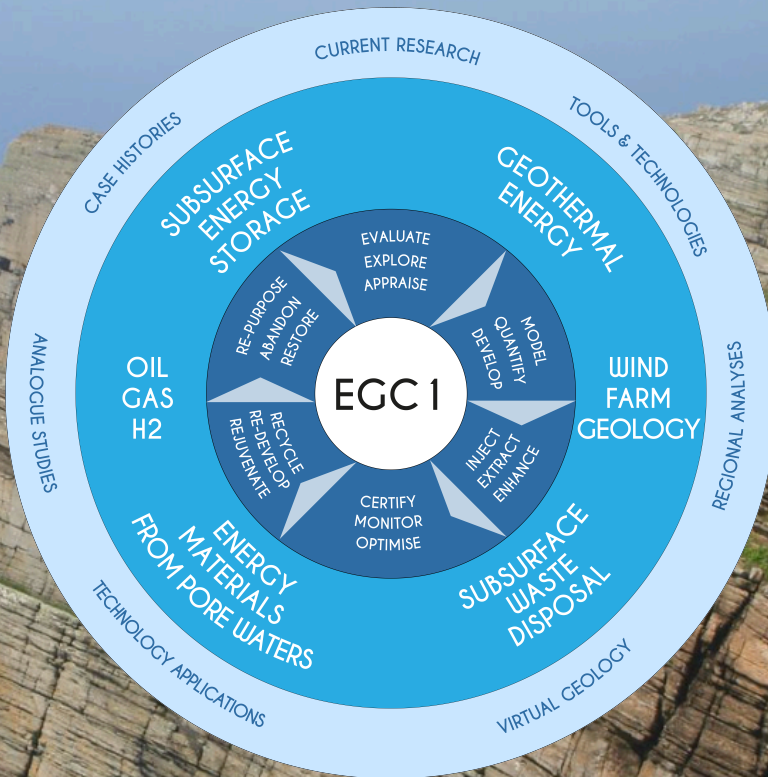
ANNOUNCING A MAJOR NEW GEOSCIENCE CONFERENCE



Powering the energy transition through subsurface collaboration

16–18 May 2023

P&J Live Conference & Exhibition Venue,
Aberdeen



Call for Abstracts

A new geoscience conference for a low carbon future.

The new Energy Geoscience Conference (EGC) aims to explore and develop the contribution of geology and geophysics to the energy transition. The EGC will be a key forum for sharing geoscientific aspects of energy supply as earth scientists grapple with the subsurface challenges of remaking the world's energy system towards a low carbon future.

Abstracts are invited across the breadth of energy-related geosciences. Sessions will reflect discipline and theme related topics including oil & gas, geothermal, subsurface energy storage, subsurface waste disposal and the subsurface aspects of renewable energy. Submissions are particularly welcomed that facilitate two-way learning and show the applicability of data, techniques and workflows across the full spectrum of energy transition applications.

In person and virtual contributions from the UK, Northwest Europe and worldwide are sought by the convenors.

**Abstract submission deadline:
30 June 2022**

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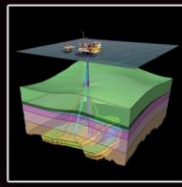
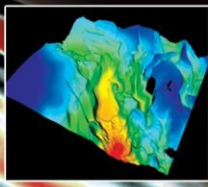
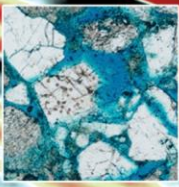
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Call for abstracts – Deadline Monday 3 December 2021

Applicability of Hydrocarbon Subsurface Workflows to CCS

28-29 April 2022

The Geological Society, Burlington House, Piccadilly London



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The IPCC recommends large-scale carbon capture and storage programmes as part of the suite of measures taken to limit global warming in line with the Paris Agreement and subsequent more ambitious targets. It is widely recognised within the geological community that the successful implementation of carbon capture and storage programmes will be crucial to meeting global climate targets, and that geologists currently working within traditional hydrocarbon activities hold many of the key skills required. But **which** skills, and how are they applied?

This two-day meeting presents an opportunity to examine current and planned CCS projects and activities, and where well-established workflows in hydrocarbon production and exploration are helping to deliver them. Abstracts are invited on all elements of the E&P cycle, from basin screening to reservoir modelling and surveillance. These are likely to cover current projects under execution, as well as conceptual studies. Through a broad range of keynote speakers and session themes, the meeting will provide an opportunity to understand and share practical and focused examples of the value of skills built and lessons learned in oil and gas activities to the energy transition.

Session themes include:

- Managing-stakeholders
- Regional screening for CCS opportunities
- Petroleum systems applications
- Reservoir modelling
- Changes to the conventional subsurface risk and uncertainty framework
- Overburden studies
- Well integrity assessment
- Sedimentology and structural geology
- Long-term monitoring techniques

For further information please contact:

Sarah Woodcock, The Geological Society, Burlington House, Piccadilly, London W1J 0BG.

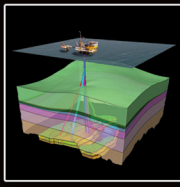
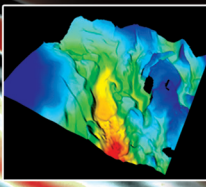
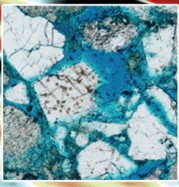
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Paul Wright
National Museum of Wales and Consultant

Trevor Burchette
Royal Holloway, University of London and CRG Ltd

Confirmed Keynotes:

Mishrif Formation reservoirs of Rumaila Field
BP

Pre-salt reservoirs of Lula Field
Petrobras

Call for abstracts - 31 December 2021

Development and Production Geology of Carbonate Reservoirs

11-12 May 2022

The Geological Society, Burlington House, Piccadilly, London

This event is being planned as an in-person conference. Depending on Covid-19 related restrictions, virtual attendance may be considered at a later stage



Carbonate reservoirs constitute some of the most important sources of global oil and gas production. They form the world's largest oil and gas accumulations, the world's highest-producing fields, and have some of the longest production histories. Significant new carbonate discoveries continue to be made, and carbonates are also a source of geothermal energy or may be utilised for gas storage.

Successful development of supergiant carbonate reservoirs can result in plateau production that may last for decades, giving high ultimate recovery factors. But, carbonate reservoirs can also be some of the most complex in terms of reservoir quality and heterogeneity. Many give disappointing ultimate recovery factors and some are deemed uncommercial with current technologies. Fundamental geological understanding, sufficient and appropriate geological and dynamic data, and the construction of effective models are the keys to optimising the exploitation of such reservoirs.

This conference will focus on how lessons learned from more than a century of discovery, appraisal and development of carbonate reservoirs may be applied to emerging discoveries. It will bring together the experiences of diverse operators with an objective of highlighting best practices for the geological characterization of carbonate reservoirs from appraisal to production.

Potential session themes:

- Excess permeability – blessing or curse?
- Pores vs stratigraphy – what controls dynamic reservoir behaviour?
- Reservoir analogues – how useful are they?
- Static modelling of carbonate reservoirs – how predictive can we be?
- Multiscale/multidisciplinary dynamic reservoir characterization – how can we integrate geology effectively?
- Improving recovery/revitalising old carbonate fields – adding value through geological understanding.
- Beyond oil and gas – carbonate reservoirs for CCUS, geothermal and other uses

Planned field trips:

9 - 10 May 2022 - Zechstein carbonates of the north-east of England, led by Geospatial Research Ltd

13 - 14 May 2022 - The Carboniferous platforms of Derbyshire, led by Pete Gutteridge, Cambridge Carbonates

For further information please contact:

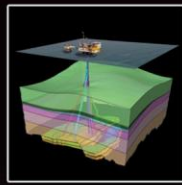
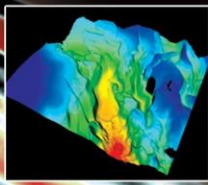
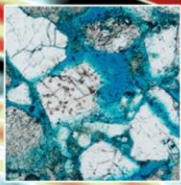
Email Sarah Woodcock, sarah.woodcock@geolsoc.org.uk, or visit the conference website - <https://www.geolsoc.org.uk/05-rescheduled-pg-carbonate-reservoirs-2022>



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#EGCarbonateReservoirs22



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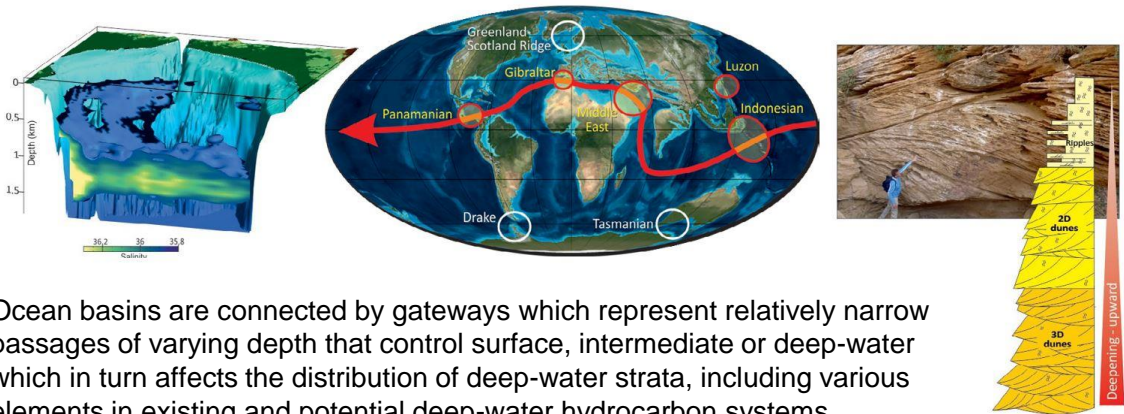
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Call for abstracts – Deadline 30 June 2022

Oceanic gateways: modern and ancient analogues and their conceptual and economic implications

23-25 November 2022

The Geological Society, Burlington House, Piccadilly London



Ocean basins are connected by gateways which represent relatively narrow passages of varying depth that control surface, intermediate or deep-water which in turn affects the distribution of deep-water strata, including various elements in existing and potential deep-water hydrocarbon systems.

In the geological past, paleogateways prevailed over dramatically different paleocirculation and marine basin dynamics (e.g., Indian Gateway, Indonesian Gateway, Central American Seaway, Betic and Rifean corridors). The opening, deepening and evolution of gateways and paleogateways strongly influences the tectono-stratigraphic and sedimentary evolution of basins, global ocean circulation, poleward temperature gradients, polar climate, exchange and vertical structure of water masses, sedimentary processes, distribution of biota, evolution/extinction events and hydrocarbon source rock and reservoir distribution. This three-day conference aims to bring together diverse experts working on modern and ancient gateways in order to improve our knowledge, models, and predictive power. Sessions will include the following themes:

- Oceanographic / palaeoceanographic processes
- Tectonic controls on gateway geometry
- Sedimentary processes and deposits within and around gateways
- Data integration and multidisciplinary analysis
- Implications of gateways and contourite deposits on geosciences applied to energy transition (CO2 sequestration and hydrocarbon exploration).

We invite oceanographers, palaeoceanographers, geomorphologists, sedimentologists and marine geologists, as well as geologists and researchers working in the broad energy sector, numerical modelling and plate tectonic reconstructions, to join the conference.

It is planned to have a specific session in this conference about the implications of gateways and contourite deposits for Energy Geosciences.

Call for Abstracts:

Please submit talk or poster abstract to sarah.woodcock@geolsoc.org.uk by 30 July 2022?

For further information please contact:

Sarah Woodcock, The Geological Society, Burlington House, Piccadilly, London W1J 0BG.

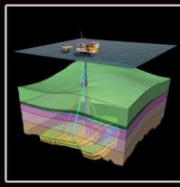
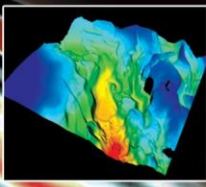
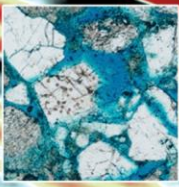
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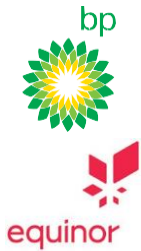
#EGGateways22





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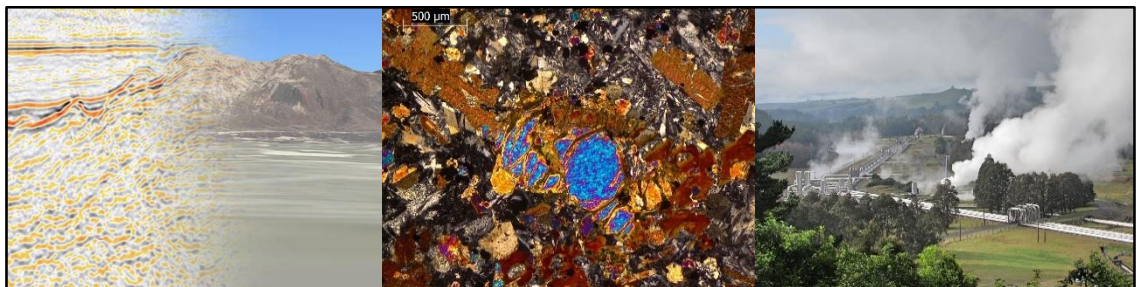


Call for abstracts – Deadline Friday 25 March 2022

The impacts of volcanism on sedimentary basins and their energy resources

8 - 9 September 2022

The Geological Society, Burlington House, Piccadilly London



A large number of global sedimentary basins are impacted by igneous systems in the form of extrusives, intrusives and volcaniclastics. Considerable research regarding the impact of these volcanics on hydrocarbon plays has been completed in recent years including the role of intrusions in basinal heat flow and fluid migration, diversion of sediment pathways in volcanic terrains, and influence of igneous material on sealing units and reservoir quality. Sub-basalt stratigraphy also continues to be an enigma in many parts of the world both in terms of seismic imaging and play element definition. There is now an opportunity to disseminate and share learnings globally, which could unlock energy opportunities in other hydrocarbon basins impacted by volcanism. Increasingly these concepts can also help to develop geothermal plays or delineate carbon capture and hydrogen storage. For example, the knowledge built up by the hydrocarbon industry on reservoir and seal characterisation in volcanically affected basins will have a strong influence on geothermal opportunities and gas storage site definition. The aim of the conference is to encourage global submissions to applied problems across the span of the energy transition. In particular the committee encourage expressions of interest for submissions regarding:

- Margin and basin-wide examples of volcanic systems and their impact on resource plays (hydrocarbons, geothermal, hydrogen, CCUS)
- Global examples of the impact of volcanics on reservoirs and seals from pore to basin-scale
- The influence of volcanics on basinal heat flow and our understanding of geothermal gradients, hydrocarbon charge and impact on geothermal systems.
- Examples of new tools to aid our understanding of volcanic impacted basins (at all scales from seismic imaging to diagenetic analysis).

For further information please contact:

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