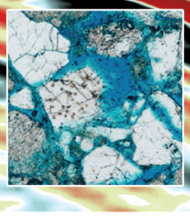
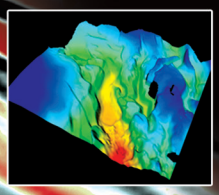
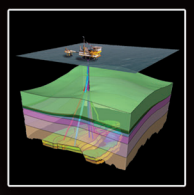

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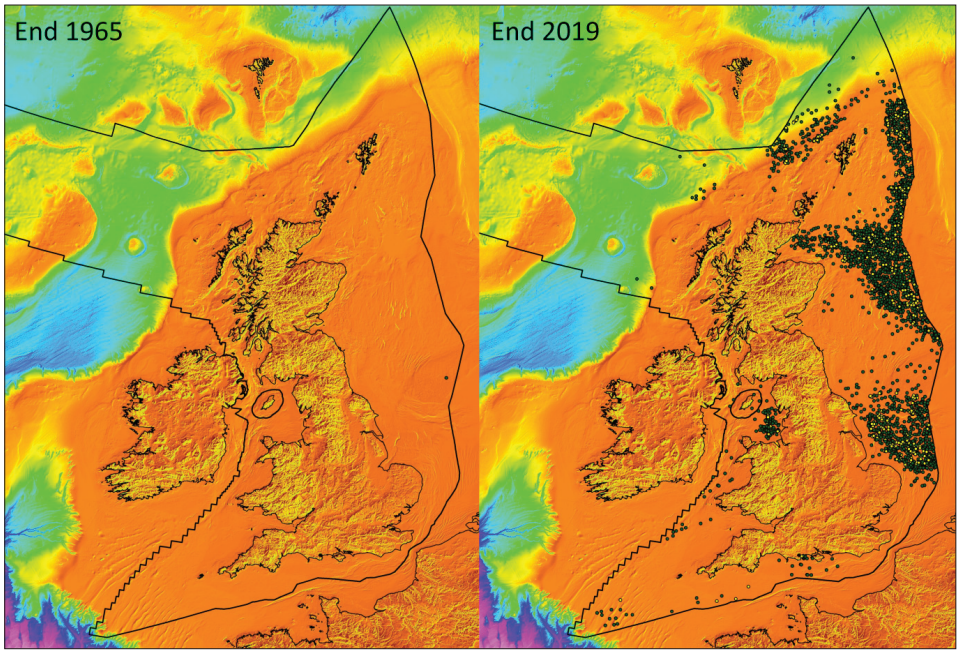
LAUNCH CONFERENCE – MEMOIR 52

UK Oil and Gas Fields

50th Anniversary Commemorative Memoir

30 November 2020

Virtual Conference



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UK Oil & Gas Fields
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Launch Conference - Memoir 52

UK Oil and Gas Fields, 50th Anniversary Commemorative Volume
G. Goffey and J.G. Gluyas (eds.)

Introduction to Memoir 52

Memoir 52 is the fourth in a widely spaced series of milestone Geological Society Memoirs on UK oil and gas fields. These Memoirs record the extraordinary journey of science, engineering, technological development, inspiration, dedication, occasional serendipity and sheer bloody-minded persistence which has led to the development of around 460 named oil and gas fields on the UK Continental Shelf. The volume is dedicated to the late John R.V. Brooks, formerly Head of Licensing at the DTI/DECC, as can be read in the dedication to the volume.

Prior to offshore exploration and production in the UK, Norman Falcon and Percy Edward (Sir Peter) Kent wrote the Geological Society's Memoir 2 (1960), 'Geological Results of Petroleum Exploration in Britain 1945–1957', which reported on the post-World War II period in which a couple of new fields were added to the existing handful of fields in the East Midlands basin. Exactly 60 years and 50 Memoirs later, Memoir 52 contains papers that include fields in the East Midlands but also papers that record some of the earliest offshore fields through to the most recent fields brought into production.

The first 25 years of the more than 50-year history of UK offshore exploration and production were recorded by Memoir 14, 'UK Oil and Gas Fields: 25 Years Commemorative Volume', edited by Ian Abbots. This Memoir was issued in 1991 and contained papers on all 64 of the then-producing UK offshore fields. After a 12-year gap, Jon Gluyas and Helen Hichens co-edited Memoir 20, 'United Kingdom Oil and Gas Fields, Commemorative Millennium Volume', published in 2003. The three-year lag between the turn of the twentieth century and release of the Commemorative Millennium Volume can perhaps be excused by the amount of work involved in creating a volume with almost 80 papers on 116 onshore and offshore fields.

Memoir 52 commemorates the 50th anniversary of the first discovery on the UKCS. Coincidentally it is also marks the 100th anniversary of the first deliberate discovery of oil onshore UK, at the Hardstoft 1 well in Derbyshire in 1919. With the first UK offshore gas and oil discoveries having occurred in 1965 (West Sole Field, Southern North Sea) and 1969 (Arbroath Field, Central North Sea) respectively, again a time lag between the milestones and release of the volume can perhaps be similarly excused by the magnitude of collective work involved in creating this largest volume of the series, with 80 papers on just under 150 fields.

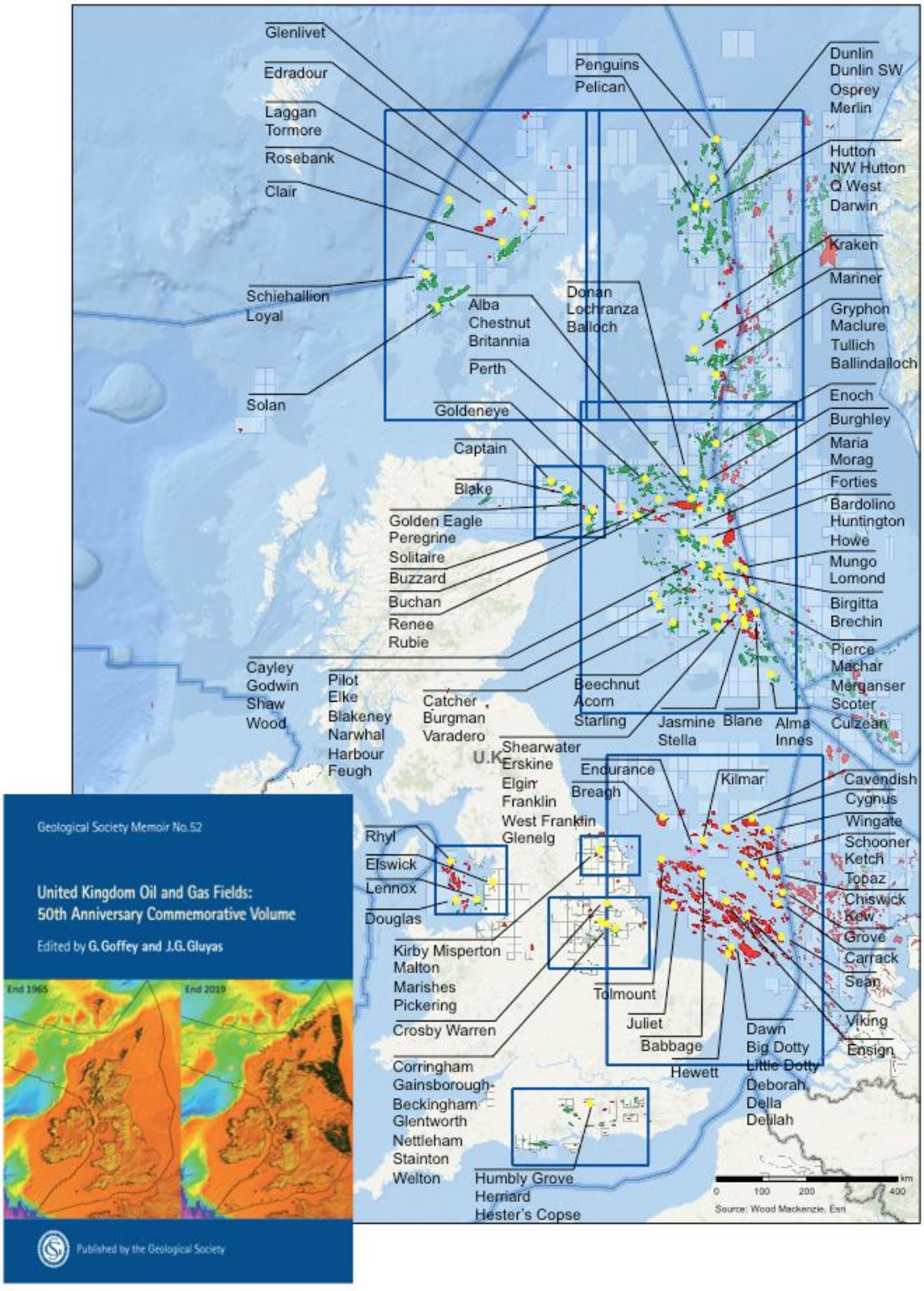
Structure and content of Memoir 52 papers and Appendix A

For ease of use, field papers in Memoir 52 mostly follow a common format:

History of exploration and appraisal
Development
Regional context
Database
Trap
Reservoir and petrophysics
Production history and reserves
Field data summary table(s)

Unlike the 2003 Memoir, the field data summary tables are not separately compiled in an appendix to the volume but are found at the end of each paper. On the Lyell Collection site,

interactive maps are available showing the various basins covered by the volume, with actionable links to the papers embedded in the field label annotations. Finally, Appendix A to the Memoir is a comprehensive, 50 page compilation of almost 1000 published references on some 500 developed and undeveloped onshore and offshore UK oil and gas fields and discoveries, with hyperlinks to the source material where possible (see example below). The editors feel this Appendix will be an extremely useful resource for workers in the UK basins.



Fields covered by papers in Memoir 52.

Field	Authors	Year	Reference
BIG DOTTY	See Dotty, Big		
BIRCH	Hook, J., Abhvani, A., Gluyas, J. G. & Lawlor, M.	2003	The Birch Oil Field, Block 16/12a, UK North Sea. *In*: Gluyas, J. G. & Hichens, H. M. (eds) *United Kingdom Oil and Gas Fields Commemorative Millennium Volume*. Geological Society, London, Memoirs, **20**, https://doi.org/10.1144/GSL.MEM.2003.020.01.14
BIRCH	Alexander, A. & Milroy, K.	2009	Better Seismic Imaging = Healthier Trees: The Birch Field, 15 years on. DEVEX 2009. http://www.devex-conference.org/programme_archives/presentation-archives.php [last accessed 22 December 2019].
BIRGITTA	Goffey, G.	2020	The Birgitta Field, Block 22/19a, UK North Sea. *In*: Goffey, G. & Gluyas, J. G. (eds) *United Kingdom Oil and Gas Fields: 50th Anniversary Commemorative Volume*. Geological Society, London, Memoirs, **52**, https://doi.org/10.1144/M52-2018-18
BITTERN	McCormick, D. & Leisham, M.	2004	The Bittern Field: Topographic control of an Eocene aged 'channel-fill' turbidite reservoir in the UK Central North Sea. AAPG Search and Discovery, Article #20016.
BITTERN	Hodic, M., Smith, S. *et al.*	2010	Bittern 4D: Integrated Modelling to Maximise Production. DEVEX 2010. http://www.devex-conference.org/programme_archives/presentation-archives.php [last accessed 22 December 2019].
BITTERN	Ritchie, L., Hodzic, M. *et al.*	2011	Bittern Development: Bittern Further Developed Through Integration. DEVEX 2011. http://www.devex-conference.org/programme_archives/presentation-archives.php [last accessed 22 December 2019].
BLACKBIRD			
BLADON	Patruno, S. & Reid, W.	2016	New plays on the Greater East Shetland Platform (UKCS Quadrants 3, 8–9, 14–16) – part 1: Regional setting and a working petroleum system. *First Break*, **34**, 33–44.

Example extract from Memoir 52's Appendix A

For more information on the papers in the volume, please refer to the editors' Open Access introductory, paper:

GOFFEY, G. & GLUYAS, J. G. (eds.) 2020. United Kingdom Oil and Gas Fields: 50th Anniversary Commemorative Volume. Geological Society, London, Memoirs, 52, 3–18 https://doi.org/10.1144-M52-2019-48

Future oil and gas field memoirs…

The Geological Society Publishing House would be most interested in publishing volumes comparable to Memoir 52 for other basins, in particular covering other North Sea jurisdictions. These volumes represent an important database of static field descriptions and dynamic observations which are valuable for petroleum exploration, appraisal, development and production but which will also be of considerable value through the energy transition, particularly in respect of CO_2 storage. Discussions are underway to endeavor to initiate a Norwegian memoir whilst the fields of Denmark and the Netherlands would provide the geographic scope for another memoir. It would be pleasing if the release of Memoir 52 could catalyse the formation of small groups of individuals willing to co-edit other such volumes. If any conference attendee has a network in any of these countries and is interested in being involved in co-editing a Denmark-Netherlands or a Norwegian volume, or has contacts who may be interested, please make contact with Graham Goffey (g_goffey@solitonresources.co.uk).

Memoir 52 Launch Conference Programme

From the almost 150 fields contained within the Memoir, some 15 papers are to be presented at this conference covering a range of themes and topics from the Memoir. The convenors would like to thank all speakers for their willingness to present at the conference, which is very much appreciated.

Conference attendees are asked not to take photographs, screen captures etc. from material presented during the conference.

		Exploration themes			Development and production themes						Late life themes					
Venue and provisional timing	Confirmed talks (titles to be confirmed)	New fields from old discoveries	Stratigraphic, downthrown, subtle or hard to image traps	New successes in established plays	New and/or uncommon reservoirs	3D fluid/lithology	Remobilised sandstone reservoirs	4D fluid/other	Drilling & completions technologies	Evolving reservoir understanding	Late life and/or enhanced recovery strategies	Extending life via field re-development	Candidate CCS	Speaker (provisional)	Company
9.20	OPENING REMARKS														
	Southern North Sea														
9.30	Tolmount		■	■										Andrew Miles	Premier
9.55	Cygnus	■	■		■									Ian Dredge	Neptune
10.20	Wingate		■							■				Richard Huis in t'Veld	Wintershall
10.45	Kilmar								■	■				Penny Milner	Alpha
11.10	BREAK														
	Central North Sea and Viking Graben														
11.35	Cayley, Godwin, Shaw, Wood		■	■										Adam Baldwin	Repsol Sinopec
12.00	Jasmine		■							■				Laura Armstrong	Chrysaor
12.25	Culzean			■										Jeppe Nygaard	Total
12.50	Penguins Cluster								■			■		Dean Thorpe	Shell
13.15	LUNCH														
	Central North Sea and Moray Firth														
14.00	Golden Eagle		■						■					Sultan Djabbarov	CNOOC
14.25	Catcher					■	■							Matt Gibson	Premier
14.50	Goldeneye												■	Nicola Stewart	Shell
15.15	Howe and Bardolino									■				Scott Liebnitz	Shell
15.40	BREAK														
	Atlantic Margin														
16.05	Rosebank				■									Cliona Dennehy	Equinor
16.30	Solan									■				Philip Horsfall	Premier
	Looking to the future...														
16.55	Endurance CO2 storage site												■	Jon Gluyas	Univ. of Durham
17.20	CLOSING REMARKS														

Conference programme, 30th November 2020

Acknowledgements

Many hundreds of people were involved in Memoir 52; inevitably a large number of authors but also a large cadre of reviewers, providers of photographs for the chapter breaks, foreword author Tony Doré, compiler of the dedication Jen Brzozowska, map provider WoodMac and others acknowledged in the volume. The willing contribution of all of these individuals and their companies is very much acknowledged and appreciated as is the financial support of the sponsors to this conference and to the Memoir itself.

Conference Programme

Monday 30th November 2020	
09.00	**Registration/Virtual Lobby**
09.20	**Welcome and opening remarks**
	Session One: Southern North Sea
9.30	**The Tolmount Field, Block 42/28d, UK North Sea** Andrew Miles*, Premier*
9.55	**The Cygnus Field, Blocks 44/11a and 44/12a, UK North Sea** Ian Dredge*, Neptune*
10.20	**The Wingate Field, Blocks 44/23b, 44/24b and 44/19f, UK North Sea** Richard Huis in t'Veld, *Argo Geoscience*
10.45	**The Kilmar Field, Block 43/22a, UK North Sea** Penny Milner*, Alpha*
11.10	**Break**
	Session Two: Central North Sea and Viking Graben
11.35	**The Wood, Cayley, Godwin and Shaw fields, Blocks 22/17s, 22/18a and 22/22a, UK North Sea** Adam Baldwin*, Repsol Sinopec*
12.00	**The Jasmine Field, Blocks 30/06 and 30/07a, UK North Sea** Laura Armstrong*, Chrysaor*
12.25	**Culzean – a new HPHT field** Jeppe Nygaard, *Total*
12.50	**The Penguins Cluster** Dean Thorpe*, Shell*
13.15	**Lunch**
	Session Three: Central North Sea and Moray Firth
14.00	**The Golden Eagle, Blocks 14/29a and 20/4b, UK North Sea** Sultan Djabbarov & Gemma Bates, *CNOOC*
14.25	**The Catcher, Varadero and Burgman fields, Block 28/9a, UK North Sea** Matt Gibson, *Premier*
14.40	**The Goldeneye Field, Blocks 14/29a and 20/4b, UK North Sea** Nicola Stewart*, Shell*
15.15	**The Howe and Bardolino fields lie in UK blocks 22/12a and 22/13a** Scott Liebnitz, *Shell*
15.40	**Break**
	Session Four: Atlantic Margin
16.05	**The Rosebank Field, Block 213/27a,** Cliona Dennehy*, Equinor*
16.30	**The Solan Field, Block 205/26a, UK Atlantic Margin** Philip Horsfall, *Premier*

	Session Five: Looking to the Future…
16.55	***Endurance C02 Storage site*** **Jon Gluyas, *University of Durham***
17.20	**Closing remarks**

Session One:
Southern North Sea

The Tolmount Field, Block 42/28d, UK North Sea

A. Miles[1], M. Allen, L. Fairweather, J. Hilton, H. Sloan and P. Zapico-Palmero
[1] Premier Oil

The Tolmount Field is a lean gas condensate accumulation located in Block 42/28d of the UK Southern North Sea. The field was discovered in 2011 by well 42/28d-12, which encountered good-quality gas-bearing reservoir sandstones of the Permian Leman Sandstone Formation. The discovery was appraised in 2013 by wells 42/28d-13 and 42/28d-13Z, which logged the gas–water contact on the eastern flank of the field. The Tolmount structure is a four-way, dip-closed, faulted anticline, orientated NW to SE. The reservoir comprises mixed aeolian dune and fluvial sheetflood facies deposited within an arid continental basin. Dune sands display the best reservoir properties with porosities around 22% and permeabilities exceeding 100 mD. Only minor diagenetic alteration has occurred, primarily in the form of grain-coating illite. Superior reservoir quality is observed at Tolmount compared to adjacent areas, due to the preservation of dune facies, a hypothesized early gas emplacement and a relatively benign burial history. Current mapped gas initially-in-place estimates for the field are between 450 bcf and 800 bcf, with an estimated recovery factor between 70 and 90%. An initial four-well development is planned, with first gas expected in 2020.

The Cygnus Field, Blocks 44/11a and 44/12a, UK North Sea

Ian Dredge[1] And Gary Marsden
[1]Neptune E&P UK Ltd

Abstract: The Cygnus Field is located in Blocks 44/11a and 44/12a of the UK Southern North Sea. The field was first discovered in 1988 as a tight lower Leman Sandstone Formation gas discovery by well 44/12- 1. After the licences had sat idle for several years, GDF Britain (now Neptune E&P UK Ltd) appraised the field from 2006 to 2010. During the appraisal phase, the lower Leman Sandstone was found to be of better quality than first discovered and the gas-bearing lower Ketch Member reservoir was also encountered. The field development was sanctioned in 2012.

The field has been developed from two wellhead platforms targeting Leman Sandstone and Ketch Member reservoirs. Five main fault blocks have been developed, with two wells in each fault block planned in the field development plan. The wells are long horizontal wells completed with stand-alone sand screens. At the time of writing, the production plateau is 320 MMscfgd (266 MMscfgd when third-party constraints apply), producing from nine wells with the final production well to be drilled.

The Wingate Field, Blocks 44/23b, 44/24b and 44/19f, UK North Sea

Richard Huis in 't Veld[1], Bart Schrijver and Alexander Salzwedel[2]
[1]*Argo Geological Consultants*
[2]*Wintershall Noordzee B.V.*

The Wingate gas field was discovered in August 2008 by Wintershall Noordzee exploration well 44/24b-7, which targeted a Base Permian closure with subcropping reservoirs of the Late Carboniferous Lower Ketch Formation. Pre-drill, significant upside was identified as a result of ConocoPhillips' nearby 44/23b-13 well (drilled in 2006), where the Westoe Coal Formation provides a seat seal to the Lower Ketch Formation. Because of the large difference in free water level between the two wells, the volumetric uncertainty of undrilled compartments with reservoirs in the Lower Ketch, as well as the Caister Formation, remained relatively high. To manage development risk and uncertainty without further appraisal expenditure, and to allow for early gas production, a phased field development was planned. That is, to appraise through development and production. Gas production, through a six-slot platform and export to the Dutch Neptune Energy operated D15-A platform (Fig. 1), commenced in October 2011, only 3 years after discovery. Initial development comprised the tieback of the exploration well and drilling of the second compartment with well 44/24b-A2Y. Subsequently, three more compartments were drilled as soon as production dropped off plateau. During the appraisal/development campaign and 7 years of production, knowledge of the reservoirs increased significantly, improving the understanding of the challenging Westphalian gas play.

Knowledge acquired during the development and production phases of the Wingate Field, as well as the analogous Dutch D12-A and D15-A Fields and studies on released data of nearby UK fields in the Caister-Murdoch System and Tyne Field, is applied by the operator Wintershall Noordzee in managing the complex Westphalian reservoirs and constructing the static-dynamic 3D reservoir models. It also resulted in further exploration success and the current development of the Sillimanite Field, which has significantly extended the life expectancy of key offshore gas producing infrastructure, the D15-A production platform and the WGT pipeline system. The most important subsurface production issues of the analogues, such as dynamic pressure behaviour, aquifer response and downhole halite scaling, and their relationship with reservoir architecture and quality, will also be discussed during the presentation.

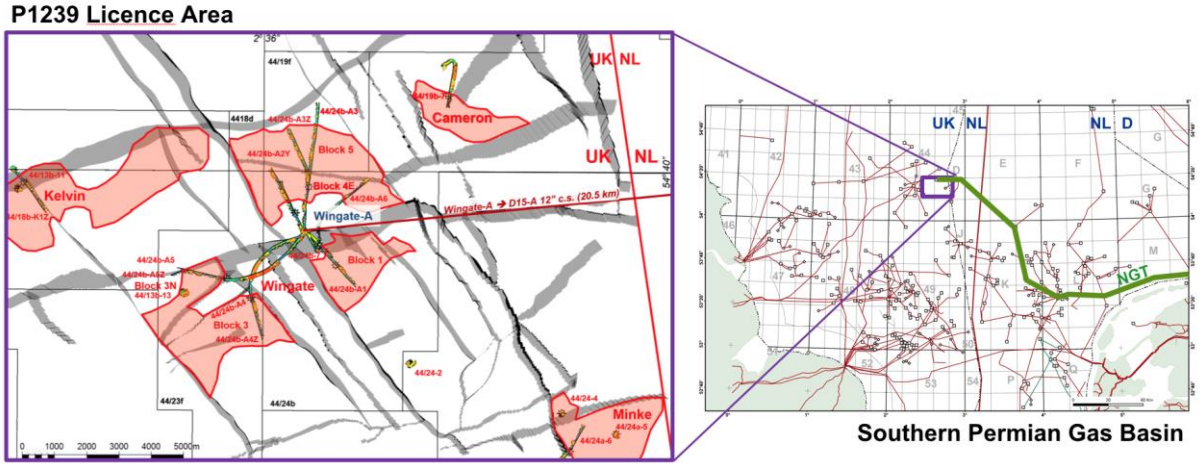


Fig. 1 Location of Wingate Gas Field in Southern Permian Basin

The Kilmar Field, Block 43/22a, UK North Sea

P. A. Milner[1] , P. J. Whailing, J. Ridings and J. Gill
[1]*Alpha Petroleum Resources Limited*

The Kilmar Field, part of the Tors complex (Kilmar and Garrow Fields), was discovered in 1992, and is located on the northern margins of the Southern North Sea Basin. Gas is produced from Namurian sandstones, at a depth of 11,000ft, from a 25 km^2 closure at the Base Permian level. The reservoir was deposited as a series of stacked channel sandstones in a fluvio-deltaic setting. Seismic imaging of intra Carboniferous strata is limited, so mapping of individual bodies of sandstone is not achievable. The development philosophy has been to maximize the drilled lengths of specific reservoir units and to contact multiple sandstone bodies by drilling long, high angle, multi-bore production wells. The sandstones are of low to medium porosity and permeability, supplemented by connection through a fracture network. At project sanction in 2005 the combined gas-in-place resource in Kilmar was estimated to be 311 bcf and a total of 75 bcf gas recovery from three wells was forecast. Cumulative gas production to date is 69 bcf. Whilst the gas-in-place has changed little, the distribution has changed between segments. The recovery factor for the field is 24%. Infill drilling opportunities have been identified, but are gas price dependent.

Keywords: Kilmar, Tors, Namurian, etc

Session Two:
Central North Sea and Viking Graben

The Wood, Cayley, Godwin and Shaw fields, Blocks 22/17s, 22/18a and 22/22a, UK North Sea

Adam Baldwin
Respsol Sinopec

The Upper Jurassic Wood, Godwin, Shaw and Cayley fields lie in Quadrant 22 on the Forties–Montrose High (FMH), a major intra-basinal high bisecting the Central Graben. The Wood Field was the first to be discovered in 1996 by Amoco. The field was later developed by Talisman Energy in 2007 via a single subsea horizontal producer tied back to the Montrose Alpha Platform. The Cayley, Godwin and Shaw discoveries followed during a drilling campaign carried out by Talisman Energy between 2007 and 2009 and were later developed, with the last field coming online in 2017. The fields are all complex structural and stratigraphic traps with reservoir in the Fulmar Formation. The Fulmar Formation on the FMH records an overall transgression, becoming progressively younger updip, with each field exhibiting a different diagenetic and depositional history in response to the unique evolution of the inter-pod in which they reside. The combined oil in place for the fields is currently estimated at 222 MMboe with an expected ultimate recovery of 84 MMboe. The addition of these reserves has been instrumental in helping to extend the life of the Montrose and Arbroath Platforms beyond 2030.

The Jasmine Field, Blocks 30/06 and 30/07a, UK North Sea

Laura Armstrong
Chrysaor

The high-pressure-high-temperature Jasmine Field lies 270 km east of Aberdeen in the UK Central North Sea and forms part of Chrysaor's J-Area. Hydrocarbons were discovered at Jasmine in 2006, in Middle-Late Triassic fluvial sandstones of the Joanne Sandstone Member of the Skagerrak Formation. Appraisal proved a greater than 2000 ft hydrocarbon column and, in 2010, the Jasmine Field development was sanctioned. Five development wells were pre-drilled between 2010 and 2013, and the field was brought on line in November 2013, after which one further appraisal and three additional production wells were drilled. Jasmine infrastructure comprises an accommodation platform and a wellhead platform tied back to a riser platform adjacent to the Judy processing and export facility.

Rapid early pressure depletion, a highly layered fluvial reservoir, structural complexity and variable fluid types present significant challenges for both static and dynamic modelling. Following production start-up, acquisition of new post-production reservoir pressure and flow data, and incorporation of allocated well production data, have been used to address these modelling challenges, and to provide encouragement for future infill and near-field exploration drilling opportunities.

Culzean – a new HPHT field

Jeppe Nygaard
Total E&P UK

The Culzean Field is situated 240 km east of Aberdeen in Block 22/25a. The Triassic and Jurassic field was discovered in 2008 and has since then been appraised and developed to deliver first gas in June 2019. The field is a high-pressure–high-temperature (HPHT) with initial conditions of 936 Bar (13 575 psi), 176°C (348°F) and charged with a lean-gas condensate. The field development plan comprises production from six development wells drilled from a wellhead platform with bridge connections to a central process platform with accommodation on an additional bridge-linked utilities and living quarters platform. This talk will summarise the field and development history with an emphasis on the recently completed field development plan as well as highlight unique features of Culzean and associated challenges compared to other HPHT fields in the region.

The Penguins Cluster

Dean Thorpe
Shell

The Penguins Cluster of fields are owned jointly (50:50) by Shell UK Ltd (Shell) and Esso Exploration and Production UK Ltd (Esso), with Shell as the operator. The cluster was discovered in 1974 and is composed of a combination of oil and gas condensate accumulations located 50–65 km north of the Brent Field, at the northern end of the North Viking Graben. Two main producing reservoirs are present: the Penguins West Field (Penguin A) consists of an Upper Jurassic Magnus Sandstone Member reservoir, while the Penguins East Field (Penguin C, D and E) consists of a Middle Jurassic Brent Group reservoir, underlain by currently undeveloped Statfjord and Triassic (Cormorant) reservoirs. The Magnus reservoir is composed of turbidite sands with an average porosity of 15% and permeabilities of 0.10–300 mD. The Brent reservoirs are composed of deltaic shoreface deposits with an average porosity of 14% and permeabilities of 0.01–1000 mD.

The fields were brought on stream in 2003 as a subsea development via what at the time was the world's longest comingled tieback to the Brent Charlie facility. A total of nine producing wells have been drilled from four subsea manifolds, producing c. 78 MMboe to date through depletion drive.

Session Three:
Central North Sea and Moray Firth

The Golden Eagle, Peregrine and Solitaire fields, Blocks 14/26a and 20/01, UK North Sea

S. J. Pinnock and D. M. Dutton
Presenters: Sultan Djabbarov and Gemma Bates
CNOOC International

The Golden Eagle Field is located 18 km north of the Buzzard Field in the Moray Firth, and consists of oil accumulations in the Lower Cretaceous Punt and Upper Jurassic Burns Sandstone members. The development area comprises three fields, Golden Eagle, Peregrine and Solitaire, but up to 90% of the oil-in-place and ultimate recovery are in Golden Eagle. The two satellite fields are primarily structural closures, while the Golden Eagle Field reservoirs have a major element of stratigraphic pinchout. Production commenced in October 2014 and approximately 140 MMbbl of recoverable oil is anticipated over its field life from the 19 development wells (14 producers and 5 injectors) that form the initial development phase. Production performance to date has exceeded expectations, aided through the use of completions that provide zonal control of the reservoir units which has successfully supported reservoir management and improved sweep efficiency.

A number of significant lessons have been learned during the early stages of the field life from the integration of dynamic data (real-time downhole fibre-optic reservoir monitoring instruments, inter- and intra-well tracers, and well interference tests) and seismic data improvements (post-start-up acquisition of high-density ocean-bottom node seismic and depth-conversion improvements).

The Catcher, Varadero and Burgman fields, Block 28/9a, UK North Sea

Matthew Gibson[1], Dominic Riley, Stephen Kenyon-Roberts, Jacob Opata, Andy Beck, Cuong Nguyen and Tom Martin
[1] *Premier Oil*

The Catcher area fields – Catcher, Varadero and Burgman – were discovered in the Central North Sea between 2010 and 2011. The three fields are found in Block 28/9a. Oil is produced from Eocene sandstones stratigraphically equivalent to the Cromarty and Tay Sandstone members of the Sele and Horda formations, respectively. The reservoir for the Catcher area fields was formed by the large-scale injection of sand from the Eocene Cromarty turbidite system into shallower Sele and Horda Formation mudstones to form the Greater Catcher area injectite complex. The Catcher area development is a floating production, storage and offloading (FPSO) based development, with 18 production and injection wells drilled from two drilling templates per field, tied back to the centrally located BW Offshore Catcher FPSO. A further development well will be drilled in 2020 to complete the base development. A phased approach to development drilling, with focused data acquisition, allowed the well layout and count to be optimized as the fields were being developed. Excellent well results have meant that the well count has been reduced relative to the development plans at sanction while delivering an increase in predicted reserves. Further infill wells and satellite field development drilling is planned for the future.

The Goldeneye Field, Blocks 14/29a and 20/4b, UK North Sea

Nicola Stewart
Shell

The Goldeneye gas-condensate field lies in the Moray Firth Basin in the UK Continental Shelf (UKCS) approximately 100 km off the NE coast of Scotland. The field was discovered in 1996 as a normally pressured accumulation with estimated gas-initially-in-place (GIIP) of 810 bcf with a thin oil rim in the Lower Cretaceous Captain Sandstone Member in a three-way, dip-closed structure. Field development included five production wells, with first gas achieved in 2004. Goldeneye was steadily produced under moderate aquifer support until cessation of production (COP) in 2010 following water breakthrough at the wells. Over its lifetime Goldeneye has produced 568 bcf of gas and 23 MMbbl of condensate.

Around the time of COP, the UK Carbon Capture and Storage Commercialisation Competition was announced, and Goldeneye was evaluated as a candidate. The removal of significant volumes of hydrocarbons through production left remaining capacity that could be refilled without reservoir pressure significantly exceeding virgin conditions. However, following withdrawal of funding from the UK Government in 2015, the project was put on hold. Since then additional subsurface work has been conducted to support the successful abandonment of the development wells, which had previously been suspended since 2010.

The Howe and Bardolino fields UK blocks 22/12a and 22/13a

Scott Liebnitz
Shell

The Howe and Bardolino fields lie in UK blocks 22/12a and 22/13a respectively, on the Eastern flank of the Forties-Montrose High. The Howe Field was discovered in 1987 by well 22/12a-1, and Bardolino in 1988 with well 22/13a-1ST. Both share common Jurassic reservoirs, have Upper Jurassic Kimmeridge Clay Formation top seals, require some form of lateral seal and have similar fluids. Howe has been producing relatively dry oil throughout its production life indicating relatively good connectivity across the field area. In contrast, the Bardolino accumulation is proven to be compartmentalised. Bardolino is likely to be segmented through some fault related mechanism.

In place volumes at the Howe Field are 46.8 mmbbl with 17 mmbbl produced thus far through a combination of natural aquifer and solution gas cap drive by subsea development well 22/12a-9Z. In place volumes at the Bardolino Field are 11.2 mmbbl with 1.1 mmbbl produced to date through depletion drive by a subsea development well 22/13a-8. This represents recovery rates of 35% for Howe and 10% for Bardolino to date. In place volumes for the undeveloped Pentland Formation at Howe are 5 mmbbl. In place estimates for the undeveloped Kimmeridge Clay Formation sandstones at Bardolino are 8 mmbbl.

Session Four:
Atlantic Margin

The Rosebank Field

Cliona Dennehy
Equinor

The Rosebank Field is located primarily in Block 213/27a in the Faroe–Shetland Basin, c. 130 km west of the Shetland Islands in water depths of c. 1100 m (3600 ft). Hydrocarbons are trapped within an elongate, SW–NE-trending four-way anticlinal structure. The principal Colsay Sandstone Member reservoir consists of several vertically stacked, Late Paleocene to Early Eocene fluvial and shallow marine reservoirs separated by volcanic sequences. Well log and core data indicate that reservoir quality is high, with porosities in the range of 19–23% and average permeability of c. 3 D. Oil quality is also high, with average oil gravity of 37°API and in-situ viscosity of c. 1 cP at a mean reservoir temperature of 175°F. The field holds a substantial resource and is currently under evaluation for development.

The Solan Field, Block 205/26a, UK Atlantic Margin

P. Horsfall
Premier Oil

The Solan Field is a Jurassic reservoired oil accumulation located in Block 205/26a in the East Solan Basin, West of Shetland. The field was discovered in 1991 by the 205/26a-4 well which encountered oil in the Kimmeridgian to Early Volgian age Solan Sandstone and appraised between 1992 and 2009 by four wells and four sidetracks. Premier Oil farmed into Licence P.164 in 2011 and became operator.

The reservoir, which is up to 100 ft thick, is a basin-floor turbidite sequence and is informally subdivided into a thick and good quality Upper Solan sandstone unit and a thinner, poorer quality, Lower Solan sandstone unit, separated by the laterally extensive Middle Solan unit. Whilst the reservoir sandstones are relatively clean (texturally and compositionally mature) and laterally extensive, sub-seismic structural and stratigraphic complexity resulted in a challenging field development.

The field development to date comprises four subsea wells (two oil producers and two water injectors) tied back to a small jacket and topsides with an innovative subsea oil storage tank. Oil export is via shuttle tanker. First oil was achieved in April 2016. The field oil in place volume is in the range of 55–85 MMbbl.

Looking to the Future…

The Endurance CO2 storage site, Blocks 42/25 and 43/21, UK North Sea

Jon G. Gluyas[1] and Usman Bagudu
[1] *Durham University*

The Endurance, four-way, dip-closed structure in UK Blocks 42/25 and 43/21 occurs over a salt swell diapir and within Triassic and younger strata. The Lower Triassic Bunter Sandstone Formation reservoir within the structure was tested twice for natural gas (in 1970 and 1990) but both wells were dry. The reservoir is both thick and high quality and, as such, an excellent candidate site for subsurface CO2 storage.

In 2013 a consortium led by National Grid Carbon drilled an appraisal well on the structure and undertook an injection test ahead of a planned development of Endurance as the first bespoke storage site on the UK Continental Shelf with an expected injection rate of 2.68 × 106 t of dense phase CO2 each year for 20 years. The site was not developed following the UK Government's removal of financial support for carbon capture and storage (CCS) demonstration projects, but it is hoped with the recent March 2020 Budget that government support for CCS may now be back on track.

GSL CODE OF CONDUCT FOR MEETINGS AND OTHER EVENTS

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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.

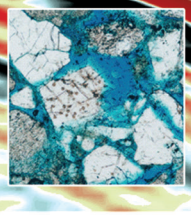
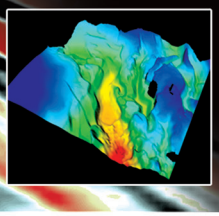
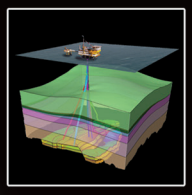
The Geological Society expects and requires all participants to abide by and uphold the principles of this Code of Conduct and transgressions or violations will not be tolerated.

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 co-operate fully with any criminal or civil investigation arising from incidents that occur during Society events.

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Durham University

Nick Pierpoint
NWP Geoconsulting

Richard Swarbrick
Swarbrick GeoPressure Consultancy Limited and Durham University

Scientific Programme Coordinators:

Toby Harrold
Repsol

Rick Lahann
Indiana University

Stephen O'Connor
Global Geopressure Advice

Binh Nguyen
JX Nippon

Tom Sinclair
Shell

Beth Stump
Chevron

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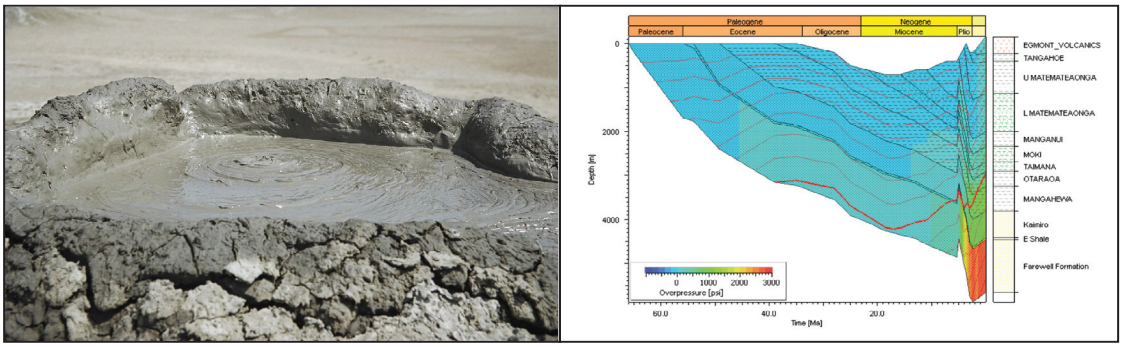
Confirmed New Date

Geopressure 2021

Managing Uncertainty in Geopressure by Integrating Geoscience and Engineering

23-26 March 2021

Virtual Conference and Masterclass



The organisers invite contributions within any aspect of geopressure but are particularly interested in the various phases of pore fluid pressure prediction, modelling and overpressure evaluation to manage uncertainty during the life cycle of a well. Suggested themes and sessions include:

- Pore Pressure and stress, especially complex stress regimes
- Impact of machine learning on PPFG
- Well engineering and PPFG
- Injecting fluids underground (including CO2)
- Coupling of Pore Pressure and FG including depletion and closing the drilling window
- Seal capacity and relationship with PPFG
- PPFG issues in mature basins (including abandonment/decommissioning)
- Classic case studies, including Macondo and LUSI mud volcano
- Pore pressure as an exploration and prospectivity tool.
- Geopressure in mature basins – lessons learnt
- Pore pressure in active tectonic basins
- Unconventional stress regimes

Event Details:

23-25 March 2021: Conferece

26 March 2021: Best practice for PP and FG - Mastery Class - Led by Richard Swarbick

Further Information:

For more information please contact sarah.woodcock@geolsoc.org.uk or visit the event website: https://www.geolsoc.org.uk/03-rescheduled-pg-geopressure-2021

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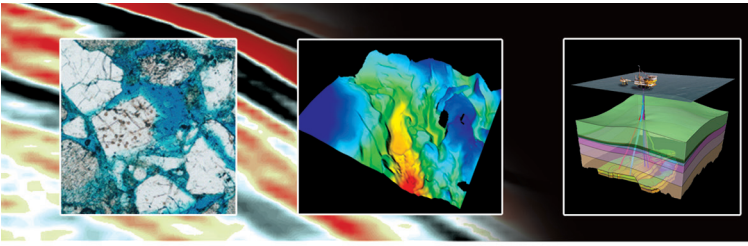
#EGGeopressure21



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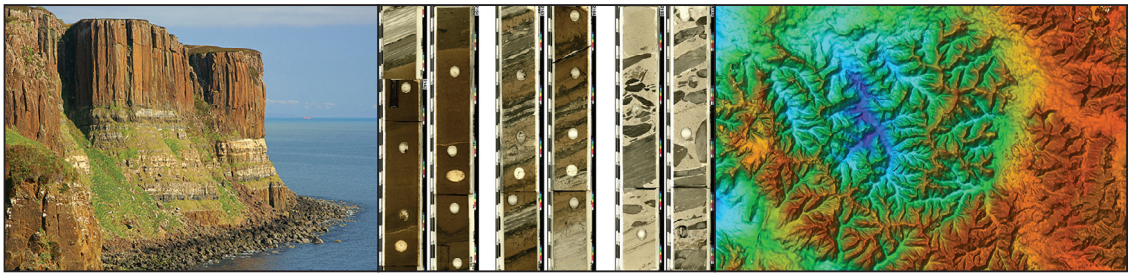
Confirmed New Date

New learning from exploration and development in the UKCS Atlantic Margin

19 - 21 May 2021

Virtual Conference



The UK Atlantic margin, including the West of Shetlands area, is the location of the UK's largest remaining hydrocarbon reserves, the largest recent field development inve tments and holds the greatest potential for future material discoveries in the UK.

In the 10 years since the last Geological Society conference on this region, great advances have been made in the understanding of its diverse plays, from fractured basement to Eocene coastal deposits, and everything in between.

This three day meeting gives a unique opportunity to learn about the geoscience of recent discoveries and field developments, as well as how technology is developing to eet the imaging and drilling challenges of the area. For a fully immersive experience, there is an opportunity to see the diverse range of reservoirs in outcrop on the Isle of Skye (13-17 May 21) and in core at the Iron Mountain facility at Dyce (18 May 21).

Conference themes:

- Paleocene deep water reservoirs
- Mesozoic pre-, syn-, and post-rift plays
- Palaeozoic play (e.g. Carboniferous and Devonian at the Clair field
- Non-clastic plays (e.g. fractured basement, volcanics, carbonates)
- Paleocene-Eocene volcanic-associated reservoirs
- Extra-UK Atlantic Margin
- Multidisciplinary technology session (e.g. advances in drilling techniques, sub-sill imaging, EOR)
- Geodynamics, basin modelling, thermal and uplift/ subsidence history, migration routes
- What's next? The next 10 years for exploration and development in the region.

Convenors:

Noah Jaffey
Shell

Jamie Collins
BP

Clayton Grove
Siccar Point Energy

Olga Shtukert
Western Geco

Christopher Bugg
Total

Douglas Watson
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For further information please contact:

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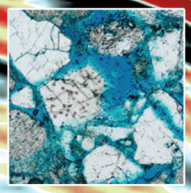
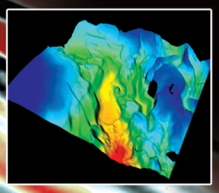
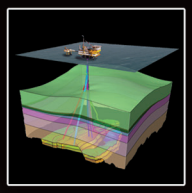
#EGAtlanticMargins21

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Lucy Williams Rockhopper

Mike Ashton Ashton Geology

Steve Dee BP

Cliff Lovelock Shell

Emma Jude BP

Anton Padin Total

Keynote Speakers:

Mike Bowman Manchester University

Patricio Desjardins Shell UCs, Houston

Haakon Fossen Bergen University

Bruce Levell Oxford University

Anna Matthews BP

Nordine Sabaou BHP, Houston

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Confirmed New Date

Core Values: the Role of Core in 21st Century Reservoir Characterisation

3-7 May 2021

Virtual Conference

Reynolds and Krevor 2015

Core has traditionally played a key role in the characterisation of conventional and unconventional hydrocarbon reservoirs, from exploration to mature production. It is the only means by which to observe and make measurements on actual reservoir rock. However, the recent oil industry downturn has driven many to question the value of taking core, due to the associated increased costs and potential risks to well operations. In tandem, advances in other reservoir visualisation techniques, such as seismic and borehole imaging, have been used to give weight to the contention that coring is an increasingly redundant means of characterising reservoirs.

Through four main themes this 5-day conference will aim to redress the balance in this debate by exploring the role core can, or should, play in the 21st century exploration to production cycle:

- Is core critical to sound commercial decision making?
- What are the challenges and benefits of integrating core-derived understanding across the geological, petrophysical and engineering spectrum?
- Integration of traditional core characterisation methods with new core, well and reservoir visualisation and mapping technologies - is the sum greater than its parts?
- How can the extensive network of global legacy core collections best be utilised to maximise their business and research worth?

For further information:

For more information, please contact Sarah Woodcock, sarah.woodcock@geolsoc.org.uk or visit the conference website: https://www.geolsoc.org.uk/05-rescheduled-pg-core-values-2021

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#EGCoreValues21