GEOSCIENTIST

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The Fellowship Magazine of the Geological Society of London

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Life after Coal

As the UK's last deep coalmine closes, Richard Hughes describes the work of the Coal Authority

CGEOLS ABROAD
Stuart Millis on Hong Kong's professional perspective

ONLINE – RADWASTE
RWM responds: UK geological disposal gains momentum

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William Smith Meeting 2016

Glaciated Margins

The Sedimentary & Geophysical Archive

2-3 June 2016 Geological Society, Burlington House, London

Confirmed keynotes:
Prof. Julian Dowdeswell (SPRI)
Prof. Carlota Escutia (Granada)
Prof. Jonathan Craig (ENI)
Prof. Chris Clark (Sheffield)

Organisers:
Dan Le Heron (Royal Holloway)
Kelly Hogan (BAS, Cambridge)
Marie Busfield (Aberystwyth)
Ali Graham (Exeter)
Wim Kouwe (Cairn)
Mads Huuse (Manchester)
Emrys Phillips (BGS Edinburgh)

Further Information:
For further information about the conference please contact:
Naomi Newbold, Conference Office, The Geological Society, Burlington House, Piccadilly, London W1J 0BG
T: 020 7434 9944
E: naomi.newbold@geolsoc.org.uk
Web: www.geolsoc.org.uk/wsmith16
Follow this event on Twitter: @geolsoc #wsmith2016

Unravelling evidence for the growth and recessional behaviour of ice sheets on continental margins has major implications for characterising the cryosphere in the past, present and future. Glaciated margins provide unique archives of past ice mass change on timescales that cannot be captured by observations of the cryosphere today. They also serve as analogues for modern-day glacial depositional environments, and are integral to solving major problems such as the magnitude of ancient glaciations, the location of prolific glaciogenic hydrocarbon reservoir deposits and the distribution of groundwater aquifers.

We seek to attract scientists from multiple disciplines – geophysicists, sedimentologists, glaciologists, geologists and geographers – with an interest in tackling these issues. The meeting will explore the latest research on glaciated margin environments based around four central themes:

- The Arctic and the Northern Hemisphere
- Antarctica and the Southern Hemisphere
- The deep time archive
- Resource potential: case studies and dilemmas

2016 YEAR OF WATER

Field trip (optional):
4-5 June 2016: post-conference field trip to study classic Quaternary glacitectonites of Norfolk. Details to follow.

My Paleogene and other times

A MEETING TO CELEBRATE THE GEOLOGICAL CONTRIBUTIONS OF CHRIS KING

Friday, April 22nd, 2016 at 9.30am
at
The Geological Society, Burlington House, London

Speakers to include: David Hight (Imperial College), Andy Gale (Portsmouth), Claus Heilmann Clausen (Aarhus), Jackie Skipper (CGC), Alan Cattell (Soils Co.), Jamie Standing (Imperial College), Rick Willemse (Toureen) & Haydon Bailey (Network Stratigraphic).

No charge for this meeting, but you must register and indicate attendance at a dinner at a local restaurant (charged)
admin@geologistsassociation.org.uk

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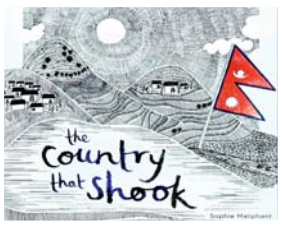
The Country that Shook

A project to raise money for Nepal

The 7.8 magnitude earthquake on 25th April 2015 had life changing consequences for almost everybody living in Nepal.

This project aims to raise money to support people who are rebuilding their lives following the quake.

For more information visit:
www.thecountrythatshook.com/shop



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> WITH HIS PASSING, THE FUTURE OF JURASSICA INEVITABLY LOOKS LESS CERTAIN. WE HOPE THAT THOSE WHO REMAIN WILL CARRY ON HIS MAGNIFICENT VISION

Front cover image: © Pepgooner/Shutterstock.com

FROM THE EDITOR'S DESK:

Mike Hanlon 1964–2016

Mike Hanlon, author and science journalist who died suddenly, aged 51, on February 9, was a good friend of the Society - although sadly, not a Fellow. I had the honour of knowing him since 1999, when he first burst upon the Media Suite of a British Association meeting, in Sheffield. After a long day spent pumping life into non-stories, a group of us headed out in his Alfa Romeo (he loved cars, fossils and space travel above all) to Castleton. With our pies and pints ordered, it took about a minute for us to discover that we were both, originally, geologists.

Mike and I met regularly thereafter, usually for lunch, collaborating on geological stories for the Express, Independent, the Daily & Sunday Mail and Telegraph, all of which employed him at one time or another. It was at such a lunch, in 2011, not far from the Kensington HQ of the Mail ("I'll meet you outside the Death Star – fly casual!"), that our conversation helped me out with an idea for an Editorial.

Published in Geoscientist 21.03 (April 2011), and entitled 'Dorset's Olympic Dream', I floated (his) idea for a new, exciting mass visitor attraction – a portal to the Jurassic Coast World Heritage Site, on Portland – effectively a large brownfield site in a deprived area of high unemployment, which was then about to host the sailing bits of the 2012 Olympics.

As yet, this idea had no name. 'Shard' architect Renzo Piano had not designed it a building. Sir David Attenborough had not become Patron, and so on. But what I had witnessed was the birth in Mike's mind of the project that became Jurassica. Mike was, after all, a Dorset boy with a passion for fossil collecting that led, eventually, to his geology degree from the University of Dundee. Jurassica brought him home, not only to Dorset but to geology.

Under his charismatic leadership the project grew fast, and Mike gave up full-time journalism to direct it. In fact, he suffered his fatal heart attack just moments after concluding a meeting of Jurassica's trustees. He was, as many have said, a force of nature; but he was also a force *for* nature. With his passing, the future of Jurassica (still scheduled to open in 2021) inevitably looks less certain. We hope that those who remain will carry on his magnificent vision, and build what would have been his crowning achievement: as a fitting memorial to a wonderful writer and great ambassador for geology.

DR TED NIELD, EDITOR - ted.nield@geolsoc.org.uk @TedNield @geoscientistmag

SOCIETY*NEWS*

What your society is doing at home and abroad, in London and the regions

President's Day 2016

Steph Jones announces President's Day 2016, on which the Society holds its Annual General Meeting and Awards Ceremony.

Last month the Society announced the winners of its medals and funds for 2016:

Content and layout have been created specifically for small-screen viewing. Mobile sites can be accessed using the usual URLs[1]:

Susan **Brantley** (Wollaston Medal); John **Underhill** (Lyell Medal); Jon **Blundy** (Murchison Medal); Michael **de Freitas** (William Smith Medal); Patience **Cowie** (Coke Medal); Monica **Grady** (Coke Medal); Liane **Benning** (Bigsby Medal); Henry **Emeleus** (Prestwich Medal); Richard **Howarth** (Sue Tyler Friedman Medal); Catherine **Mével** and Edmund **Nickless** (Distinguished Service Award); Paul **Denton** (R H Worth Prize); Mitchall **D'Arcy** (Wollaston Fund); Anja **Schmidt** (William Smith Fund); Tracy **Aze** (Lyell Fund); Craig **Magee** (Murchison Fund). The President's Awards for 2016 will be announced in the May issue.

The Awards will be presented at President's Day on 8 June 2016. On that day (full details in the May issue) there will be research talks by the four senior medallists: Susan **Brantley** (Pennsylvania State University); John **Underhill** (Heriot-Watt University); Jon **Blundy** (University of Bristol); and Michael **de Freitas** (Imperial College) on their current or most recent work.

All Fellows are welcome to attend the events of President's Day, though lunch with the Award winners will incur a charge. Full details of charges and instructions for registration will be published in the May issue, which will be accompanied by the *Annual Report 2015*.

Update your record!

Have you changed job, moved home, or have a new email address? If so, you should update your Fellowship record writes Dave Jones*.

Do you, or a colleague, wonder what the Society is doing near you, but haven't heard from your regional group in ages?

A typical regional group email is sent to 600+ recipients. Around 10% bounce back as 'undeliverable' so you can imagine what this does to our inboxes! If we can't reach you we can't tell you about the fantastic range of events happening nearby.

Mailing lists are generated from your online account, so please update your details by logging into 'MyGSL' at **www.geolsoc.org.uk** and select your preferred regional group in 'Manage Fellowship'.

* **Dave Jones** is Council member with special responsibility for Regional groups.

➤ At the time of writing the 'MyGSL' function on the website is undergoing maintenance. **If this problem is still continuing** by the time you receive this issue, please email **membership@geolsoc.org.uk** with your new contact details.

LONDON LECTURE SERIES

The Water Book

Speaker: Alok Jha (ITV News, and Author, *The Water Book*, Headline, 2015) **Date:** 20 April

Programme

- Afternoon talk: 1430pm Tea & Coffee: 1500 Lecture begins: 1600 Event ends.
- 1730 Tea & Coffee: 1800 Lecture begins: 1900 Reception.

Further Information

Please visit **www.geolsoc.org.uk /shelllondonlectures16.** Entry to each lecture is by ticket only. To obtain a ticket please contact the Society around four weeks before the talk. Due to the popularity of this lecture series, tickets are allocated in a monthly ballot and cannot be guaranteed.

➤ Contact: **Sarah Woodcock**, The Geological Society, Burlington House, Piccadilly, London W1J 0BG, **T:** +44 (0)20 7432 0981 **E: sarah.woodcock@geolsoc.org.uk**

Geological Society Club

The Geological Society Club, successor to the body that gave birth to the Society in 1807, meets monthly (except over the field season!) at 18.30 for 19.00 in the Athenaeum Club, Pall Mall, or at another venue, to be confirmed nearer the date. Once a year there is also a buffet dinner at Burlington House. New diners are always welcome, especially from among younger Fellows. Dinner costs £57 for a four-course meal, including coffee and port. There is a cash bar for the purchase of aperitifs and wine. Burlington House dinners include wine.

- **2016 meetings:** 6 April, 11 May.

All will be held at The Athenaeum Club.

➤ Fellows wishing to dine or requesting further information about the Geological Society Club, please email Caroline Seymour on **carolineseymour554@hotmail.com**

Geoscience Education Academy

Do you lack confidence when teaching geological topics and would like to develop your skills?

Now in its seventh year, the Geoscience Education Academy provides free curriculum-led training for UK teachers. It's a great opportunity for non-geologists to gain support and resources to teach the geoscience part of the curriculum, as well as a refresher for existing geology teachers, and a chance to network and share ideas.

The 2016 Geoscience Education Academy will be held on 27-30 July at The Geological Society, Burlington House, London. The GEA is completely free to attend with all travel reimbursed and accommodation provided.

➤ Register online for a place or browse photos and feedback from previous years. **W: www.geolsoc.org.uk/gea**

From the Publishing House

Anne Davenport and Jenny Davey bring you the latest news from the Society's Publishing House.

Recently published

- From *Petroleum Geoscience*: Thematic set on Geomodel uncertainty
- From *The Journal of the Geological Society*: The Emu Bay Shale Konservat-Lagerstätte: a view of Cambrian life from East Gondwana, by John R. Paterson, Diego C. García-Bellido, James B. Jago, James G. Gehling, Michael S.Y. Lee, and Gregory D. Edgecombe
- From the *Scottish Journal of Geology*: How hot are the Cairngorms? By Jon Busby, Martin Gillespie, and Sev Kender
- From *Geochemistry, Exploration, Environment, Analysis*: El Niño–La Niña cycles and biogeochemical sampling: variability of element concentrations within E. camaldulensis leaves in semi-arid Australia, by C. Mitchell, S. M. Hill, D. Giles and K. Hulme
- From the *Journal of Micropalaeontology*: Morphological Change During The Ontogeny Of The Planktic Foraminifera, by Aude G. M. Caromel, Daniela N. Schmidt, Ian Fletcher, and Emily J. Rayfield

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Online books for fellows

As part of your membership you are entitled to free online access to over 400 books in the Book Archive, which includes Special Publications, Memoirs and Engineering Geology Special Publications, published up to and including 2012. For a small additional fee you can extend access to books in the same series published from 2013 to the present day. Find out more at **www.geolsoc.org.uk/fellowaccess**.

April dates

GSL are attending the European Geosciences Union (EGU) conference between 17-22 April 2016, if you're attending, do visit us at booth 61.

Bookshop newsletter

To find out more about new books, maps and promotions, sign up to GSL's bookshop newsletter at **www.geolsoc.org.uk/newslettersignup**

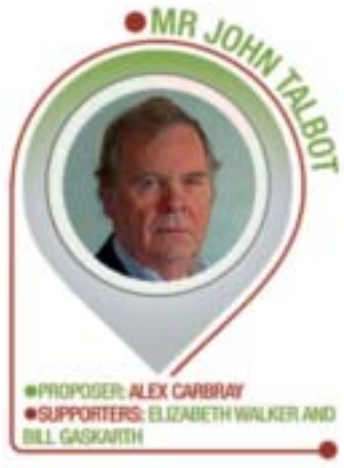
➤ Register online for a place or browse photos and feedback from previous years. **W: www.geolsoc.org.uk/gea**

SOCIETY*NEWS...*

Mr John Talbot & Dr Chiara Petrone

The March issue of *Geoscientist* carried the 2016 election information and by unfortunate accident, substituted a picture of Dr Chiara Petrone for that of Mr John Talbot. *Geoscientist* and its production company *CenturyOne* would like to extend their sincere apologies to both candidates for this error, which was introduced between first and second proof stage and for that reason went unnoticed. We are pleased to reproduce here Mr Talbot's statement together with the correct picture.

Mr John Talbot



As an undergraduate civil engineer in the late 1960s, I had the extreme good fortune to be introduced to and taught geology applied to engineering for all three years of my degree course, by Professors Bill Dearman and Duncan Murchison, who instilled in me a lifelong passion for geology. My first move on graduating was to seek Fellowship of the Society in 1970-71. Since then I have gained an MSc in Geotechnical Engineering in 1981, followed by Chartered Engineer, Geologist, Environmentalist and Scientist. I am also a European Engineer and Fellow of the Institution of Civil Engineers.

My pre-retirement career was generally in civil engineering and specifically in geotechnical engineering, when I provided technical and financial project management and advice to a wide client base; in both the public and private sectors. I had technical expertise in all aspects of site investigations; the analysis, design and provision of advice on shallow and deep foundations, maritime and inland waterfront structures, highways, slope stability and earth dams in the UK, Europe, Africa and SE Asia.

Having been a scrutineer for over 20 years, and a reviewer and auditor for Chartered Geologist applications more recently, I would now like to give back yet more to the profession. Although I am currently Chairman of both the Professional Accreditation Committee on behalf of the Society's Professional Committee, and a Sub-committee to review our CPD recording system on behalf of the Chartership Committee, I am standing for election in the hope that I could make a greater contribution to the affairs of the Society as a Council member.

FUTURE MEETINGS

Dates for meetings of Council and Ordinary General Meetings until June 2017 will be as follows:

◆ **Council/OGMs:**

2016: 6 April, 22 June, 20 September, 24 November;
2017: 1 February, 4 April.

FROM THE LIBRARY

Discover our new online Library catalogue!

The Geological Society Library is delighted to announce the launch of a new online Library catalogue, making it easier for Fellows and Corporate Affiliate members to search our collection, both remotely and in the Library.

◆ Features include

- straightforward search functionality
- details of loan availability
- all the latest additions to the Library's collection
- links to e-books and other online content
- user friendly records with linked keyword search

You can access the new catalogue via the Library pages on the Geological Society website.

◆ Coming soon

During 2016 we will be adding new functions to the catalogue such as Reader Logins, which will allow you to view your loan history, create bibliographies, set search preferences, request items and renew your loans.

◆ Get in touch

If you have any questions, comments or suggestions regarding the catalogue, we'd love to hear from you. **E: library@geolsoc.org.uk**, or speak to a member of staff in the Library at Burlington House.

◆ From the Library

The library is open Monday-Friday 09.30-17.30
http://www.geolsoc.org.uk/library

◆ Library newsletter

Subscribe to our bi-monthly newsletter to keep up-to-date with important Library news, electronic journal updates, online exhibitions, events and more:
http://www.geolsoc.org.uk/newslettersignup

◆ New acquisitions

A month-by-month list of new books and serial special issues which have been added to the catalogue can be viewed on our website at
www.geolsoc.org.uk/library_collections

➤ The library is open to visitors Monday-Friday 0930-1730. For a list of new acquisitions click the appropriate link from **http://www.geolsoc.org.uk/info**

Black Swan Rocks

Mysteries of the unexplained; **Arjan Reesink*** calls for a place to publish and discuss the unforeseen from the geological record

Science considers all swans to be white until someone observes a black swan – at which point the white-swan theory needs to be amended. This example from Karl Popper provides a powerful motivation to pay systematic attention to odd rocks.

Our first explanations of the world around us are, inevitably perhaps, based on what we know. This 'availability bias' has been implicitly introduced into geological thinking by Hutton and Lyell: our present is the key to Earth's past. We use our more abundant knowledge of the modern world as our first point of reference for rock interpretations - unavoidable, logical, good practice. Yet we readily accept that current global warming, extensive land use for agriculture, environmental change, and the current sea level high-stand are unusual in geological history. So how do we relate 'now' and 'then'?

Preservation

This question – what elements of a landscape survive geological time – is determined by sedimentary preservation processes. We can investigate the nature of these through theory, numerical experiments, measurement of strata, or experiment. Sandy bedforms, like ripples and dunes, develop fast enough to experimentally test hypotheses on the dynamics of sedimentary preservation in real time. Coupled with statistical insights, these different lines of research have led to the development of a dominant paradigm for sedimentary preservation: erosional scour removes the tops of deposits, and only a small proportion remains. However, river sediments also contain bedforms that are preserved intact. These indicate an absence of later erosion, and therefore refute the original proposition that erosional scour is the only control on sedimentary preservation. Intact bedforms are the 'black swans' of river deposits.

So we modify our view. A recent study of fully-preserved dunes reveals that preservation potential changes in the presence of bars and river banks because bar- and bend-scale geomorphology changes local flow patterns and sediment budgets. Preservation of bedforms varies from zero to intact, even within the confines of a single river channel. We are now faced with the task of quantifying precisely how much preservation potential changes within the larger-scale context of bars and river bends. It is a brand new day, all because some bedforms were preserved intact!

Broader lesson

As a community, we often investigate the most abundant rocks. This too, is logical and good practice because it makes the study relevant to more situations. However, focusing on what is average and abundant also makes our understanding vulnerable. We need studies of the unusual and the extreme to identify the limits of our models. This requires that we generate a place where we can publish small accounts of odd observations that are not easy to interpret, and observations that do not have interpretations yet. We need a place to publish and discuss the unforeseen, our 'black swan rocks'.

Further reading

Reesink A J H, Parsons D R, Van den Berg J, Amsler M L, Best J L, Hardy R J, Lane, S N, Orfeo, O & Szupiany, R (2015) **Extremes in dune preservation; controls on the completeness of fluvial deposits Earth Science Reviews**, 150, p 652-665 **http://authorselsevier.com/a/1RpEY_IgSFNwx** Nicholas A P, Sambrook Smith G H, Amsler M L, Ashworth P J, Best J L, Hardy R J, Lane S N, Orfeo O, Parsons D R, Reesink A J H, Sandbach S D, Simpson C J, and Szupiany R N (2015) **What controls preserved alluvial stratigraphy? Geology** – 44.1 3-6

* **Dr Arnold Jan H Reesink FGS**, is Research Fellow in Earth Surface Dynamics Geography and Environment, University of Southampton, UK.

SOAPBOX CALLING!

Soapbox is open to contributions from all Fellows. You can always write a letter to the Editor, of course: but perhaps you feel you need more space?

If you can write it entertainingly in **500 words**, the Editor would like to hear from you. Email your piece, and a self-portrait, to **ted.nield@geolsoc. org.uk**. Copy can only be accepted electronically. No diagrams, tables or other illustrations please.

Pictures should be of print quality – please take photographs on the largest setting on your camera, with a plain background.

Precedence will always be given to more topical contributions. Any one contributor may not appear more often than once per volume (once every 12 months).

> FOCUSING ON WHAT IS AVERAGE AND ABUNDANT ALSO MAKES OUR UNDERSTANDING VULNERABLE. WE NEED STUDIES OF THE UNUSUAL AND THE EXTREME TO IDENTIFY THE LIMITS OF OUR MODELS
> **Arjan Reesink**

AFTER COAL

After the closure of Kellingley, what does the Coal Authority do? **Richard Hughes and Steven Kershaw*** talk to *Geoscientist*

Above: ***Dealing with the legacy of coal mining demands a little more than memorials and public art***

Coalfields underlie some 26,000 km² - 11% - of the surface area of England, Scotland and Wales. Since the start of the industrial revolution, human settlement has followed natural resources, industry and employment - and coalfields today are consequently some of the UK's most densely populated regions. Some seven million properties lie within them; 1.5 million lie above workings where coal has been mined at depths of less than 30m, and at least 172,000 coal-mine entries are known. Although there is relatively little active coal-mining today, and all deep coal-mining has now ceased, centuries of underground and surface extraction have left a huge legacy of environmental issues and public safety hazards.

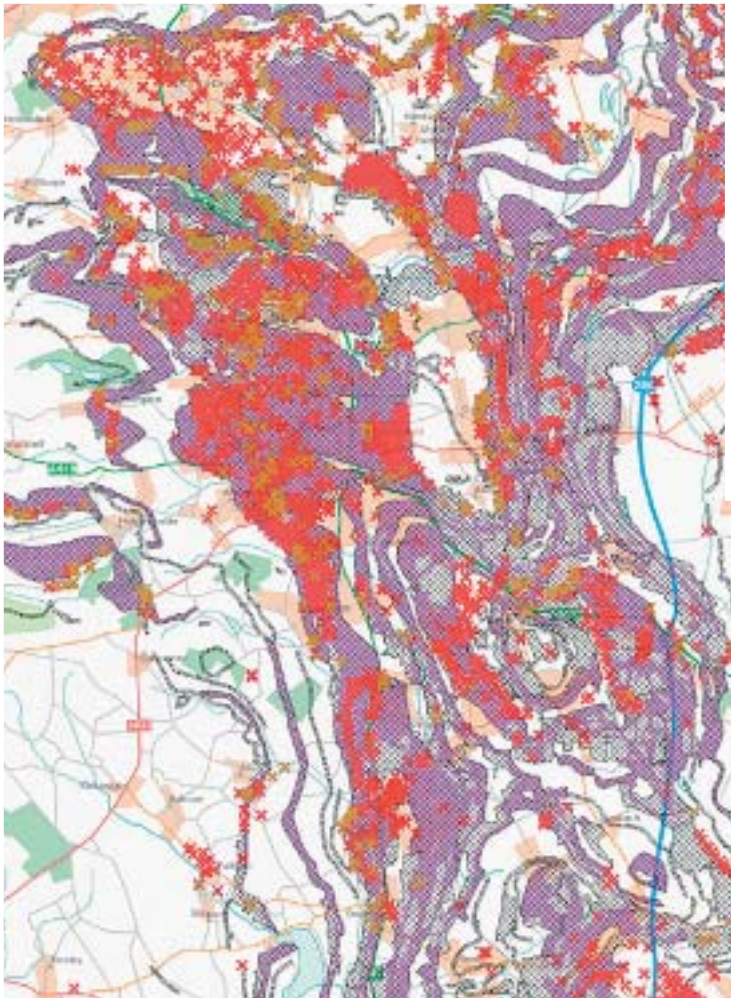
The Coal Authority was created under the 1994 Coal Industry Act, when the previously state-owned coal industry was privatised, to regulate the industry and manage its various legacy issues. Later, the 2011 Energy Act expanded the Authority's remit to include the treatment of non-coal mining legacy issues. Today, its main functions are:

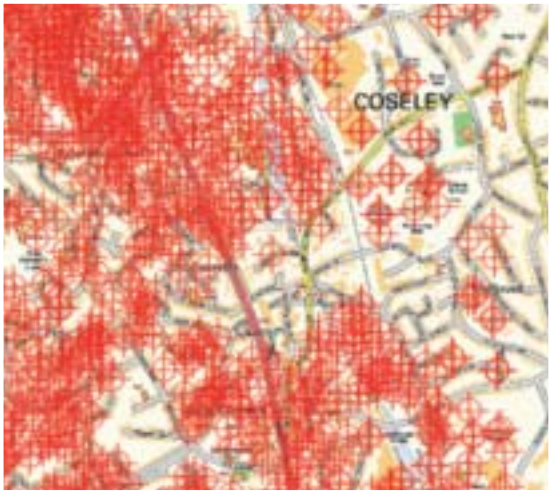
- protecting the public and property from the effects of surface mining hazards and subsidence,
- managing and treating contaminated coal and non-coal mine-waters,
- providing mining hazard information for conveyancing, property development and risk management,
- providing planning guidance as a statutory consultee, and
- licensing and regulating coal extraction.

Mining information

Data underpins every aspect of the Authority's work. Its digital coal mining

> CENTURIES OF UNDERGROUND AND SURFACE EXTRACTION HAVE LEFT A HUGE LEGACY OF ENVIRONMENTAL ISSUES AND PUBLIC SAFETY HAZARDS





Left: Coal Authority digital mining data for north Derbyshire. (Topography based on Ordnance Survey mapping © Crown Copyright and Database Right 2011)

Top right: Density of mine entries in an urban setting, West Midlands. (Topography based on Ordnance Survey mapping © Crown Copyright and Database Right 2011)

Bottom right: Shaft collapse beneath residential property, Scotland

data-sets derive largely from c. 120,000 mine abandonment plans, held on behalf of the Health and Safety Executive in the Authority's purpose-built records centre in Mansfield, north Nottinghamshire. Over the past 30 years these plans have been digitally captured, interpreted by mining surveyors, and integrated with other data to produce unique, digital data-sets documenting the history of coal-mining activity. Data are updated daily with new information from coal operators, site investigations and other sources.

Much of the Authority's spatial mining hazard data can be viewed free of charge on the web, and high resolution data sets are now available for commercial licensing. The Law Society of England and Wales advises conveyancers to purchase a mining search report for all property transactions in coalfields. The main delivery channel for the Authority's coal mining information is therefore a property-specific mining search report. Its unique, fully automated reporting system produced c. 340,000 of these in 2014/15, with 99% of all reports ordered and dispatched digitally, with a turnaround time measured in minutes.

Data are vital to the Authority's work as statutory consultee for planning applications, enabling risks to development from mining to be identified. For planning purposes 'low' and 'high risk' areas are identified on county maps, available for download free of charge. In 'high risk' areas the Authority's planning team processes consultations on some 5500 planning applications and 500 development plans each year - deciding whether further research or a site investigation is required before development can proceed. If a site investigation is deemed necessary, the Authority will issue an access permit to the workings and evaluate the techniques to be used, ensuring that any risks to public safety are adequately managed.

Public safety

One third of the 172,000 documented coal mine entries are to be found in what are now urban areas, so a substantial legacy of mining hazards remains within many major conurbations. Surface collapses above abandoned workings and shafts present the most common risks to the public. A 'hazard line', open 24 hours a day, seven days a week, enables the public to report mining hazards around the clock – and the despatch of immediate responses. About 1000 surface incidents are reported each year, roughly half of which turn out to be mining-related.

The scale of these issues means that costly proactive remediation of the surface effects of shallow mineworkings and mine entries is carried out only where there is ▶

Engineering works enabling treatment of a collapsed shaft, Scotland

Collapsed shaft treatment in north east England

Restored colliery tip at Caerau, Bridgend, South Wales

a high risk to persons or property. Known shafts represent discrete high-risk zones, and in 2008 the Authority began a mine-entry inspection programme to identify such locations for proactive remediation. To date, some 130,000 shafts have been inspected – of which 1 % required remedial attention.

Most typically, damage caused by shallow workings occurs when the collapse of the mine roof migrates to the surface, forming a 'crown-hole'. Collapses of deep, unfilled shafts may be more serious, especially where thick superficial deposits can create a cone of failure tens of metres across. In a recent example in Scotland, one of a pair of adjacent shafts collapsed, threatening to draw an adjacent residential property into the void. Treatment required demolition of two residential properties, allowing the shafts to be grouted and sealed with a reinforced concrete cap.

'Non-standard' shaft collapses require more specialist treatment. A recent example in north east England occurred in a shaft that also acts as a discharge point for mine waters. To prevent the shaft from collapsing in on itself and affecting nearby buildings, a silicate resin foam plug was installed. Final treatment involved the sinking of a 10.5m diameter pre-cast concrete segmental caisson to a depth of 7.5m around the collapsed shaft, enabling the failed section to be demolished, removed and re-built with pre-cast concrete sections. The shaft cap was constructed with an aperture, to allow mine waters to rise and fall within the new shaft section.

Tips and escapes

There are estimated to be over 5000 colliery waste tips in England, Scotland and Wales, with over 1200 in the South

Wales coalfield alone. Most of these tips belong to local authorities and major landowners, but the Authority manages 41 of the largest sites - including Aberfan. This was the site of a major disaster 50 years ago this year, when failure of a tip caused 144 deaths. (*Geoscientist* will publish a special commemorative issue about Aberfan in October). Today, the Authority's expertise is also being applied to the management of abandoned metalliferous mine tips and settling ponds in other parts of England.

Gas escapes from abandoned mines to the surface present a significant risk to the public, and have caused fatalities over the years. The principal risks come from explosion due to the escape of methane, and asphyxiation by low oxygen/high carbon dioxide mixtures, known commonly as 'blackdamp'. These risks are greatly increased where gases leak into buildings and other confined spaces.

Vents are installed in workings suspected of containing gas at pressure, which are regularly monitored for any changes in gas composition. Two protective pumping schemes have been installed in north east England to prevent the ingress of gas into residential properties, while elsewhere, mine gas is allowed to vent naturally into the atmosphere.

Mine water

Significant environmental impacts can arise from contaminated mine waters, which are typically rich in soluble iron derived from minerals such as iron pyrites. When these reach the surface, oxidation causes precipitation of iron ochre, which is toxic to flora and fauna and discolours natural watercourses.

Under the European Water Framework Directive (WFD) member states are required to maintain their water bodies at 'good' status. The Authority works with the Environment Agency, the Scottish Environmental Protection Agency and Natural Resources Wales to identify and treat sites so that they comply with the WFD. To this end, the Authority has designed and operates over 70 mine-water treatment schemes in England, Scotland and Wales.

Mine water is either pumped or allowed to reach the surface naturally. Pumped schemes are used to prevent uncontrolled emissions, or to prevent contamination of aquifers. At surface, the water is then treated either passively (using settling lagoons and reed beds), or using an active plant.

Passive treatment is used for most coal-mine waters. A typical scheme will use an aeration cascade to accelerate the release of carbon dioxide from solution and increase oxygenation, both of which catalyse iron precipitation. Most settles out in the lagoons, from which the water is then passed through reed beds to reduce its iron content further – typically to less than one milligram per litre - before entering streams, rivers and the sea.

To prevent contamination, the Dawdon treatment scheme in County Durham treats saline, iron-rich water pumped from mine workings below an aquifer serving the conurbations of the north east. The Authority is currently working to exploit the considerable geothermal potential of this, and other, pumped treatment systems.

Waters from abandoned metal mines typically do not contain high levels of iron and therefore often appear clean and even drinkable, despite being rich in toxic metals. In contrast to coal, no single organisation has responsibility for dealing with the legacy of metalliferous mining. However, the Department for Environment, Food and Rural Affairs (Defra) funds the Coal Authority to treat metal-mine waters in England, and three such schemes are operational.

Iron-rich waters from an abandoned ironstone mine in Cleveland once issued into Saltburn Gill, which then ran over a beach and into the North Sea. The scheme has now removed this eyesore, improving water quality and the amenity value of the beach. A second scheme treats water from the abandoned former lead-zinc and baryte Force Crag mine in the English Lake District, preventing contamination of Bassenthwaite Lake. This scheme uses a vertical flow-pond system and employs sulphate reducing bacteria to precipitate metal sulphides within the compost substrate - removing over 98% of zinc, 94% of lead and 94% of cadmium in its first year of operation.

The Authority also manages the abandoned Wheal Jane metal mine in Cornwall on behalf of Defra. Between April 2014 and March 2015, 5.4 million cubic metres of water were abstracted to maintain the water at safe levels and prevent polluted waters from issuing into the Fal estuary. An active plant treats the water, removing during the same period over 90% of contaminants (including one tonne of copper, ▶

***Above:** Mine gas vents at the Stadium of Light, Sunderland*

> STRONG REGULATORY PRACTICE BEFORE, DURING AND ON CLOSURE OF EXTRACTIVE OPERATIONS IS ESSENTIAL FOR MANAGING LONG-TERM MINING IMPACTS AND ENCOURAGES INVESTMENT BY PROVIDING STABILITY AND CERTAINTY FOR MINE DEVELOPERS

- 0.1 tonne of cadmium, 127 tonnes of zinc, 15 tonnes of manganese and 7 tonnes of arsenic!).

Mining regulation

Strong regulatory practice – before, during and on closure of extractive operations – is essential for managing long-term mining impacts, and encourages investment by providing stability and certainty for mine developers. The Authority regulates and licenses coal mining operations, and works with other regulatory bodies on mining matters. The Authority's Independent Compliance Unit (ICU) provides restoration liability bond assessment services to other public bodies (such as local authorities), ensuring that liabilities are understood and quantified before and during mining operations.

Research & innovation

The Authority sponsors research to understand and help reduce any risks from mining legacy hazards. Trials and research are carried out into the basic mechanisms associated with removal and precipitation of iron from coal-mine waters. These include the effects of aeration and oxidation on the residence time to allow for optimum precipitation, and the contribution of bacteria and plants to schemes' performance. The Authority also works with Defra, the Environment Agency and university partners to trial new physical and chemical techniques for metal-mine water treatment.

The Authority's engineers have also investigated the use of alternative materials for sealing mine entries and carried out field trials on the behaviour of rock and resin composites. Using such methods could have significant environmental and cost benefits over standard 'concrete and steel' solutions, especially in remote or difficult-of-access areas.

Future

The Coal Authority is proud of its 20-year record of safeguarding the public, property and the environment from the adverse impacts of mining. Historically this has been paid for by government, but maintaining and growing this valuable work at a time of considerable pressures upon public finances presents many challenges.

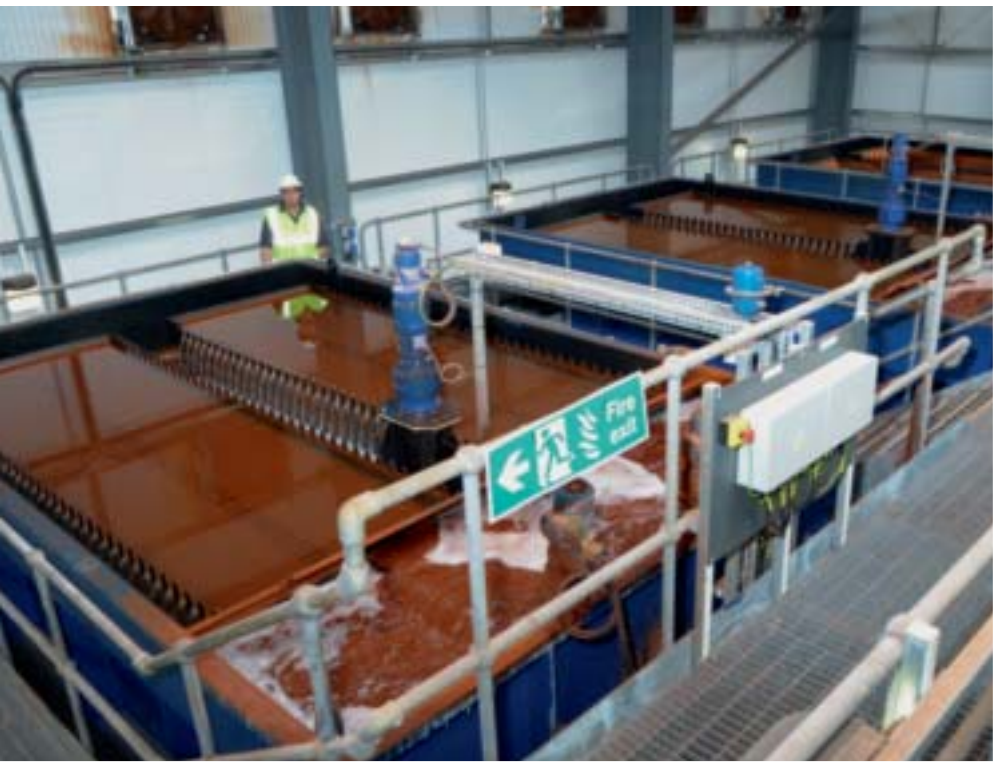
In response, the Authority has embarked on a strategy to make itself less dependent upon public funding. The pillars of this strategy are to fully realise the economic value of our people and our unique information assets. The Authority is also working to exploit the commercial value of waste products such as iron ochre, and geothermal energy from its mine-waters.

All our regulatory and legacy management services are now available on a commercial consultancy basis to clients with the UK, and internationally. The Authority also now licenses its unique mining hazard data-sets commercially to major infrastructure operators, for hydrocarbon exploration and to value-added re-sellers, and is expanding its range of information services.

Through the success of this strategy the Authority looks forward to carrying on its essential work in protecting the public, property and environment from the legacy impacts of mining. ◆

FURTHER INFORMATION
For further information visit **www.groundstability.com, www.gov.uk/coalauthority** or contact E: **richardhughes@coal.gov.uk**

* **The Coal Authority,** 200 Lichfield Lane, Mansfield, Nottinghamshire NG18 4RG. **Steven Kershaw** is now retired.



Coal mine water-treatment plant at Dawdon, County Durham

Force Crag mine-water treatment scheme, English Lake District

Saltburn Gill before and after mine-water treatment

Adequate regulation is essential to ensure full post-extraction site restoration

CHARTER
FLIGHT

Stuart Millis* on the Chartered Geologist overseas – a Hong Kong perspective from the Chair of its Regional Group

Anyone who has ever worked in Hong Kong cannot have failed to notice the local love for business cards and, hand in hand with this (within the engineering industry at least), the love of collecting qualifications to proudly present on them. It will come as no surprise to most, then, that the CGeol qualification flourishes in Hong Kong, with between five to 10 new applicants each year and over 85 Chartered Geologists registering Hong Kong as their base of operation. What may surprise you though is the time and effort it has taken to reach a situation where CGeol is looked upon as enjoying parity with the professional qualifications obtained by our engineering brethren.

Modern era

The modern era of geotechnical engineering/engineering geology in Hong Kong (these being the fields in which c. 90% of HK geologists operate) began in the late 1970s with the establishment of the Geotechnical Control Office (GCO) in the Hong Kong Government - now known as the Geotechnical Engineering Office (GEO). The need for this arose after a number of major landslides in 1972 and 1976, most notably at Po Shan Road and Shek Kip Mei, which highlighted a lack of geotechnical control, requiring significant government action to overcome.

Geologists had had significant input into construction projects before this, but it was piecemeal: notable contributions were called for in major civil engineering projects, (in particular the High Island Dam project), but not so much in day-to-day development work.

The establishment of the GEO changed this, and a number of major slope-safety initiatives arose - resulting in a corresponding elevation of the role of, and need for, geologists. In 1978-79, visionary applications of engineering geological/geomorphological mapping resulted in the 'Mid Levels Moratorium for Building Development' (May 1979).

This moratorium was implemented because of slope safety concerns arising from multi-storey re-development in one the most expensive pieces of real estate in the world (at the time). This led to seminal projects like the Mid Levels Study, the terrain-classification-based Geotechnical Area Studies Programme (1979-1989), the remapping of the geology of Hong Kong and the creation of a permanent Geological Survey of Hong Kong (1982).

These things all contributed to elevating geology's profile and resulted in an influx of geologists to Hong Kong. This further enhanced and reinforced the quality of work provided on other major geotechnical projects, such as the expansion of the Mass Transit Railway (MTR) and various other notable tunnel schemes and civil projects.

Recognised

The importance of sound geological input was therefore well recognised at last, with engineering geologists filling senior positions in both government engineering bodies and private consultancies. With government-led support, this created a positive environment for public and private sector geologists to interact with those in the education sector, as demonstrated in 1981 by the formation of the Geological Society of Hong Kong.

By the mid-1980s, a GEO-led scheme to train engineering geology graduates was up and running, highlighting the need for sound training and integration of skills. The scheme also put pressure on academia to establish Hong Kong-based first-degree courses, as trainees at this time were all educated overseas.

The increasing rate of development throughout the 1980s and early 1990s meant that geologists not only played key parts in the numerous slope safety studies and civil engineering and development projects, but also helped to drive government policy on major livelihood issues of the day, including the need to re-house some 300,000 squatters located within landslide- ▶

Above top: *Fei Ngo Shan Debris Flow*
Above middle: *Hong Kong Link Road*
Above lower: *Hong Kong West Drainage Tunnel*

Left: *Development at Anderson Road*

> THE CGEOL QUALIFICATION FLOURISHES IN HONG KONG, WITH FIVE TO 10 NEW APPLICANTS A YEAR AND OVER 85 CGEOLS REGISTERING HK AS THEIR BASE OF OPERATION

Above: *Po Shan Road landslip*

Left: *Landslide Mitigation Works*

prone hillsides in 1983, and floodplain management studies arising from the severe flooding of 1987.

Geologists were also deployed in the Housing Department to assist with major housing construction. In the late 1980s and early 90s, geologists were also instrumental in advancing the concept of 'cavern' development, resulting in the construction of underground sewage-treatment works, refuse transfer-stations and explosives storage magazines. They also contributed to pioneering work in the management of fill supply and contaminated mud disposal for a range of reclamation projects, including the new airport development at Chek Lap Kok.

Perseverance

However, this was still the 'pre-CGeol' era, and many geologists generally had to establish themselves either by virtue of perseverance and strong reputation, by obtaining engineering qualifications through the Geotechnical Discipline of the Hong Kong Institution of Engineers (HKIE), or as Chartered Engineers through the IMMM. This meant that by the early 1990s only a handful of the geologists working in Hong Kong held Chartered status.

However, declining workloads in the late-1990s following the completion of Chek Lap Kok Airport and its associated infrastructure, together with the knock-on impacts of the Asian Financial Crisis, seemed to trigger a shift in the status of geologists in Hong Kong, with the geotechnical departments of many companies becoming reliant on the government's Landslip Preventive Measures (LPM) Programme - the geologists' role often being limited to supervising ground investigation works, cutting geological sections and (if you were lucky enough to have an enlightened employer) the odd bit of slope stability analysis and stabilisation design.

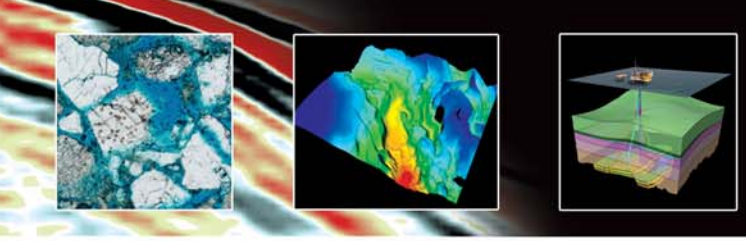
Taking note of this diminishing status and the need for maintenance of 'standards', the geological community took steps in the late 90s and early 2000s to redress the balance. These included (to name but a few) the establishment in 1995 of the first local Earth Science undergraduate course (which we're happy to say is now GSL accredited) after almost 10 years of effort, the formation of the Hong Kong Regional Group in 2001 (the first and so far only overseas Regional Group of the GSL); a push within Government and Consultancies for CGeol to be afforded equal status to engineering qualifications; the establishment of a 'Resident Geologist' role for construction supervision on projects where ground conditions played a major part (with CGeol as the defined required qualification for the position); and the specification of CGeol staffing requirements within the tender documents for some government projects. CGeol also became the *de facto* benchmark for promotion in many organisations, marking a significant milestone and transition in the career of many local geologists.

Accreditation

The recent introduction of accredited Company Training Schemes, rapidly embraced in Hong Kong with over five schemes approved by the end of 2014, has also done much to lift the profile of geologists within companies and is proving very attractive to young graduates, providing them with a well-structured early career path.

Overall, these efforts have been very successful and geologists in Hong Kong have enjoyed an increasingly prominent role in the conceptualisation, design and delivery of numerous major projects over the past decade. With increasing focus on geohazard assessment through the government's Landslip Prevention and Mitigation (LPMit) Programme and mandated requirements for hazard assessments for all new residential and infrastructure developments, as well as numerous strategic and technical studies on the enhanced use of underground space through rock cavern developments to relocate and house various 'NIMBY' facilities, it looks like the future for Chartered Geologists in Hong Kong will remain bright for many years to come. ◆

* **Stuart Millis** is Chair, Hong Kong Regional Group.



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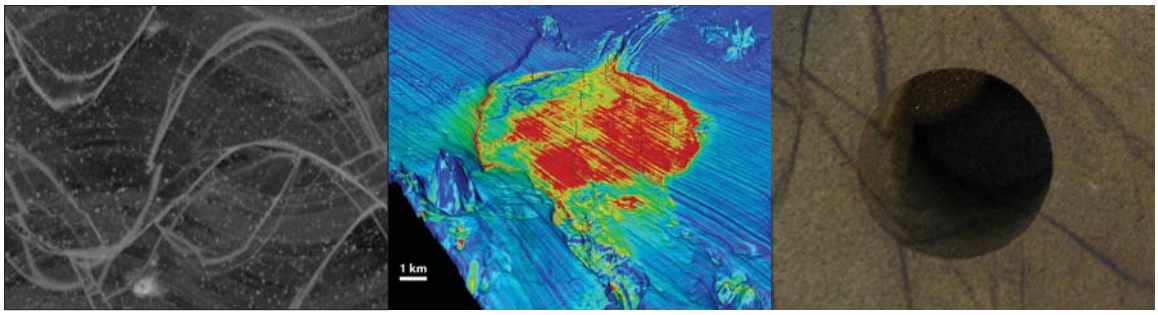
Call for Abstracts – Deadline: 30 June 2016

Deep-water Depositional Systems: Advances and Applications

25-27 January 2017

The Geological Society, Burlington House, Piccadilly, London



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Deep-water deposits continue to provide major reservoir targets for oil and gas exploration around the world as well as presenting a series of challenges within developing and producing fields. Considerable effort has been devoted to the understanding of these deposits both in terms of reservoir architecture and quality across the academic-industry interface. Progress has been made in understanding of whole-system source-to-sink relationships and controls, the mechanics of erosional and depositional processes, and the fine-scale architecture of the resultant deposits. Allied to this progress has been the advancement in characterisation techniques/technologies, which has impacted upon workflows and the ability to analyse uncored as well as cored intervals at a greater level of refinement.

This 3-day international conference will bring academic and industry geoscientists, petrophysicists and engineers together, to share new developments in the following thematic areas:

- Depositional processes – sediment gravity flows to bottom currents
- Source to sink – deepwater systems
- Canyons and channels
- Confined slope systems – mobile substrates/ structure and sedimentation
- Mass transport deposits
- Distributive systems
- Impact on exploration and production outcomes
- New techniques in reservoir characterisation and modelling

Call for Abstracts:

Please submit paper and poster contribution to laura.griffiths@geolsoc.org.uk by 30 June 2016.

For further information please contact:

Laura Griffiths, The Geological Society, Burlington House, Piccadilly, London W1J 0BG.
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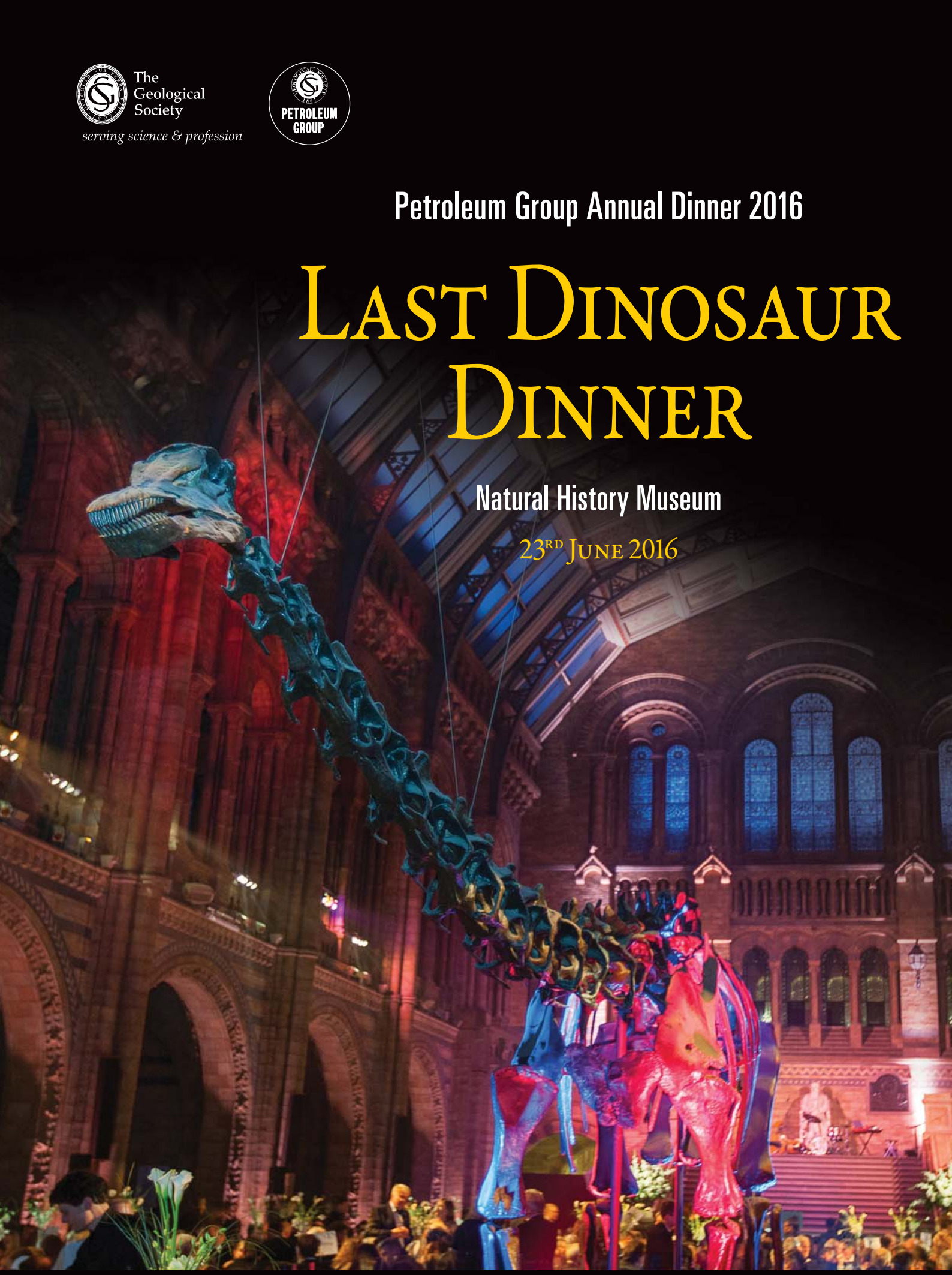


For further information or to book a table for this event, please contact laura.griffiths@geolsoc.org.uk

READERS' LETTERS

Geoscientist welcomes readers' letters. These are published as promptly as possible in *Geoscientist Online* and a selection printed each month. Please submit your letter (300 words or fewer, by email only please) to **ted.nield@geolsoc.org.uk**. Letters will be edited. For references cited in these letters, please see the full versions at **www.geolsoc.org.uk/letters**

Nodding in agreement – but don't forget the ditch cuttings!

Cutting remarks

Sir, I was very interested to read Gary Nichols' Feature *Ground Truth* (*Geoscientist* 26.1, pp17-18) concerning the advantages of fieldwork in the oil and gas industry - with which I completely agree. There is also a large body of geologists who work in my side of the industry - oilfield services - who also have considerable field experience: namely, mudlogging crews and wellsite geologists. They catch and describe samples during the drilling stage; and while this is not quite the same as looking at large exposures in the field, it does allow first-hand observation of the reservoir formations - as well as any oil they may hold.

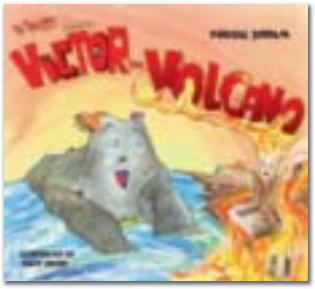
The detail visible via a hand lens at an exposure can also be seen in cuttings samples taken usually every 3m (measured depth, not vertical depth) within the reservoir section. It is routine for the mudlogging crew and wellsite geologist to describe the cementation, porosity and permeability characteristics of likely reservoir formations and record them on daily and end-of-well reports.

Add to this the interpretation of gas data and advanced gas-monitoring and interpretation services, core, seismic and petrophysical data are greatly bolstered. An office-bound reservoir geologist can simply sit a modest x10 microscope on their desk and ask for the cuttings samples of a well to be delivered to them.

I am cheered to hear that some operators still value training, because in these lean times it has completely stopped for geologists in oilfield service companies which are shedding staff in the hundreds and cancelling all non-profit-making expenditure, ultimately to satisfy shareholders.

CRAIG BUNTING

Victor the Volcano



Many children's' books convert inanimate objects into characters. *Thomas the Tank Engine* springs to my mind first, along with Bob and his mechanical mates from the building site. But Dougal Jerram is breaking new ground, in this household at least, by casting a volcano as the star of his new book.

The story follows Victor, a frustrated inactive cone from the Italian island of Vulcano (where else?) as he follows his Uncle Etna's advice to consult other volcanoes round the world about how he too can become properly explosive. He heads off to Mexico first, to speak with Pedro Popocatepetl, followed by a tour that takes in Kimmy Kilimanjaro, Emily Erebus in the South Pole, Freddy Fuji, and finally Iceland Izzy on the mid-Atlantic ridge.

The volcanoes all speak in rhyming verse and the jolly, childlike paint-and-pastel sketches add to a building picture of worldwide volcanicity. However a couple of the visits are to summits that, although well-known, are hardly currently qualified to advise Victor about the joy of magma. Jerram does acknowledge that Kilimanjaro is currently so iced up that her lava flows might struggle to escape, but the scientific saddo in me did wonder – why didn't he just choose another currently active volcano? (I had to check: the highest peak of Kilimanjaro is Kibo, which last erupted 200 years ago).

As the audience for which this book is intended is a lot younger (and less cynical) than I am, I passed it to my son Finn. At 10, increasingly self-aware and having just finished reading the latest Rick Riordan novel and *The Hunger Games*, he was keen that I should stress that this book wouldn't be his normal choice of reading. But he likes a bit of geology, and was happy to offer his opinions. Here is what he said.

"I like this as it's a story with facts in, so will help children to learn. The personification (his word, honest) is a clever way to bring geology alive for children. I'd say that this book is going to be good for age 4-7. Younger children will like listening to it, and older ones will enjoy learning about volcanoes as they read it themselves."

And then, to remind me of just how old I am, he came out with this clincher: "I really like the expression on Victor's face when he's about to blow up at the end. He's been made to look constipated!"

Reviewed by ***Judi and Finn Barrett***

VICTOR THEVOLCANO
by DOUGAL JERRAM, Illustrated by David Erdos. Rudling House Publishing Ltd 2015. 18pp, sbk. ISBN 978-0-9928689-3-2
List price: £6.99 www.rudlinghouse.com; www.victorvolcano.com

The hunt for the golden mole

In this neat little book Richard Girling delivers a slice of popular science writing with the ability to transport the reader from sitting room to savannah and back again, considering the study of environment and biodiversity from desk to field. Part memoir, part natural history lecture, part cautionary tale, *The Hunt for the Golden Mole* presents a multifaceted and personal voyage of discovery into evolution, life and extinction.

In essence the voyage is sparked by a single question: 'Where does one start in the hunt for a creature that may or may not exist?' The Somali Golden Mole was first described in the mid-1960s, based solely on the evidence of a jawbone fragment found in an owl pellet. It has never been seen in the wild. Stirred by this story, Girling sets off on a bout of 'undisciplined research', to delve deeper in to our human knack for collecting, cataloguing and controlling the natural world, while also conducting a genuine hunt for further evidence of the existence of this tiny creature.

Though best read as a whole, this book is a compendium of pieces focusing on discrete topics including the history of scientific naming, hunting and species collecting at the turn of the century, taxonomy and cladistics and contemporary challenges for wildlife management and preservation.

It is a tale of adventure; but the physical travels are sometimes an understated surprise, sitting at adjectival odds with the intellectual journey. The staccato narrative can make the author's thought-process difficult to follow, though this is part of the charm of the piece - written in a stream-of-consciousness style, studded with literary references and copious asides that make for compelling reading.

Having a great story to tell is one thing, but having the ability to tell one is quite another, and Girling has both. Flashes of literary flourish surface where intellectual or emotional passions break through. It is easy to become engrossed in the tales, travelling alongside the author on his small-yet-large voyage of personal and universal discovery.

From the excitement of his mental and physical journey and wonder of his human and animal encounters, it becomes clear that every creature has a story to tell; that no matter how small and obscure (or even, potentially, non-existent!) each plays a key role in its host ecosystem. The book also acts as a platform to raise a personal and collective alarm: work on biodiversity conservation is far from over, and the interests and actions of the individual are significant in ensuring the continued existence of ecosystems as we know them.

Reviewed by ***Carla-Leanne Washbourne***

THE HUNT FOR THE GOLDEN MOLE: ALL CREATURES GREAT AND SMALL, AND WHY THEY MATTER
by RICHARD GIRLING, Published by Chatto & Windus 2014 ISBN-13: 978-0701187156 320 pages hbk.
List price: £16.99 www.randomhouse.co.uk

Geoethics - the role and responsibility of geoscientists

Geoethics.org defines geoethics as dealing 'with the ethical, social and cultural implications of Earth Sciences education, research and practice, and with the social role and responsibility of geoscientists in conducting their activities'. The 21 papers in this book address the interaction between geologic processes, geoscientists, the general public, and decision makers.

Most papers present geohazard examples but groundwater, oil and gas development, geotourism, geoheritage siting, and geoeducation issues are also

included. Communication, (or, more commonly, lack of effective communication) between geoscientists, the general public, and decision makers is an appropriately common theme in the book, with particular focus on effectively communicating the risk that a geologic event will occur within a specified time frame.

While geoethics may address the intersection of geoscience, sociology, politics, and human welfare, geoscientists are not experts in all these areas. Item nine of GSL's Code of Conduct states: "Fellows must not presume to be experts in fields other than their own, or accept professional obligations that they are not competent to discharge." Albarello's paper on communicating uncertainty makes an important ethical point. As geoscientists, we should effectively communicate the probabilities of an event occurring. Thus we are effectively the bookmakers. But we are not the policy makers deciding what the public should do. We should not place the bets. Doing so, or being viewed as having done so, leads to the legal troubles of the seismologist defendants in the L'Aquila trial - the subject of another paper in the book.

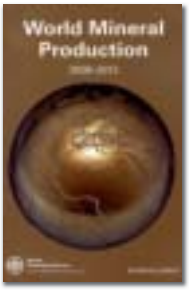
One of the major failings of papers in this book is the lack of discussion of basic geoscientific ethical principles that would provide an ethical foundation for the topics covered. GSL was a participant in the development of (and is a signatory to) the 2015 AGI Guidelines for Ethical Professional Conduct. Sadly, neither these nor any other guidelines are cited as an ethical foundation. We must remember that ethics are not necessarily the equivalent of whatever concept someone views as good. Nor is ethical analysis always able to arrive at a unique answer. Instead we must agree to disagree and respect that the other side has a sound ethical basis for its opposing position.

Despite this lack of ethical foundation, this book provides important case histories and guidance for geoscientists operating at the intersection of geoscience, the public, and decision makers.

Reviewed by ***David M Abbott Jr***

GEOETHICS: THE ROLE AND RESPONSIBILITY OF GEOSCIENTISTS
by S Peppoloni (Editor), G Di Capua (Editor), Published by: the Geological Society of London, Special Publication 419, August 2015. Hardback, ISBN 978-1-86239-726-2.
List price: £85.00 (Fellows £42.50)
www.geolsoc.org

World Mineral Production 2008



The British Geological Survey maintains one of the world's largest databases on the production and trade in minerals. This book is an annual summary of world mineral production statistics over a rolling five-year period. 'Centenary Edition' refers to the fact that the database underpinning it is continuous from 1913. The data provides necessary intelligence for assessing security of mineral supply, economic analyses, and issues of regulation, policy and planning.

As budget cuts continue in the UK, BGS is undertaking a review of how and why they continue to produce mineral statistics. Their website includes a short survey to inform the decision making process. It is opportune that a review of this publication is available to the geoscience community and especially those working in the minerals sector.

Initially, the prospect of reviewing this book was a little worrying. After all, tabulated data are monotonous and those that engage with statistical publications can be unusual ('they may not be normal but they are transformable'). It was a relief then, to find that this edition, atypically, includes coloured infographic pages and a historical overview.

BGS's mineral data covers a period of major historical change and the drivers behind its compilation have also evolved from a UK (and Empire) focus to a global web-based resource now covering 177 countries. The overview includes changes to patterns of mineral supply and demand and how these were reflected in global production. After the Cold War, for example, the main consuming nations became increasingly dependent on cheap mineral supplies from developing countries.

Today, concern continues over the supply of so called 'critical' raw materials used in the manufacture of new technologies and clean energy. China produces over 90% of rare earth elements and unease came to a head in 2000-2010. Both the USA and Australia subsequently recommenced REE mining after many years without production.

World mineral production data are available from other organisations. The database under consideration is more historically complete than these (e.g. USGS production figures commence in 1931) and has a greater international focus, especially during the 20th Century. This extensive, continuous database and BGS's expertise in its management have allowed them a recent key role in a number of EU mineral projects.

The World Mineral Production volume could readily become a five-year publication, with a statistical summary for interim years available online only. Infographic pages for all commodities should be presented on the website and included in each five-year publication.

Reviewed by ***Peter Wormald***

WORLD MINERAL PRODUCTION 2008-2012 CENTENARY EDITION
by T J BROWN, N E IDOINE, E R RAYCRAFT, R A SHAW, E A DEADY, J RIPPINGALE, T BIDE, C E WRIGHTON & J RODLEY, 2014. Published by: British Geological Survey 115pp (pbk) ISBN: 9780852727669
List price: £30.00 www.bgs.ac.uk/mineralsuk /statistics/worldStatistics.html

BOOKS Available for review

Please contact **ted.nield@geolsoc.org.uk** if you would like to supply a review. You will be invited to keep the review copy. See a full up-to-date list at **www.geolsoc.org.uk/reviews**

- **Stochastic Analysis of Scaling Time Series - from turbulence theory to applications** by Schmitt FG and Huang Y. Cambridge UP 2016 204pp hbk
- **The Oracle of oil - biog. of Marion King Hubbert** by Mason Inman 2016 W W Norton 385pp pbk
- **Eruption - the untold story of Mount St Helens** by Steve Olson 2016 W W Norton 241pp pbk
- **Industrial Structural Geology** by F L Richards *et al.* (eds) Geological Society Special Publication #421 267pp hbk
- **Chemical, Physical and Temporal Evolution of Magmatic Systems** by L Caricchi et al. (eds) Geological Society IAVCEI Special Publication #422 223pp hbk
- **Volcanic Geology of Sao Miguel Island (Azores Archipelago)** by Gaspar et al (Eds) Geological Society Memoir #44, 2015 hbk 309pp
- **Applied Thermodynamics for Meteorologists,** by Sam Miller. 2015. Cambridge University Press 285pp, hbk
- **Energy, the subtle concept – the discovery of Feynman's blocks from Leibniz to Einstein** by Jennifer Coopersmith (revised) 2015 Oxford University press 422pp, sbk.
- **Precession, Nutation and Wobble of the Earth** by Dehant and Mathews 2015. Cambridge University Press, 536pp, hbk.

PEOPLE *NEWS*

CAROUSEL

All Fellows of the Society are entitled to entries in this column. Please email ted.nield @geolsoc.org.uk, quoting your Fellowship number.

◆ Simon McCurdy

has left Tarmac after 20 years and founded Evolution Geological Limited, offering geological consultancy services to the extractive industry. (**www.EvolutionGeological.com**). He is also currently Chairman of Extractive Industry Geology Conferences Ltd (EIG), which is hosting its biennial conference at the University of Birmingham in September 2016. (**www.EIGConferences.com**).

◆ Richard Sillitoe

was the 2015 recipient of the Society of Economic Geologists' prestigious R A F Penrose Gold Medal, awarded for lifetime contributions to the science and practice of Economic Geology. He also received the 2014 Mining Journal Mines and Money Lifetime Achievement Award.

◆ Peter Styles

Keele University and Editor in Chief, Geoscientist, has won the Royal Astronomical Society's Service Award for 2016.

Rehoming journals

Two Fellows wish to offer their paper journal accumulations to good homes before consigning them to the recycling

Sean Karley is looking for a good home for his collection of Society publications.
Journal of the Geological Society:
Volume 20. Complete, bound in one volume:
Volumes 127 to 135. Looks complete;
Volumes 140 to 154. Looks complete.
Also: *Quarterly Journal of the Geological Society*, Nos. 418 to 504 (1949 to 1971). Looks complete.

If interested please contact Sean Karley; 30 Harrowden Road, Wellingborough, Northants, NN8 5BH.
T: 01933-225397.
E: **seankarley@tiscali.co.uk**

These can be collected from Northampton or Wellingborough, by arrangement. They could be posted to other areas at cost of P&P.

Andrew Bowden has hard copies of *Quarterly Journal of Engineering Geology (& Hydrogeology)* 1974 - 2008 (vols 7-41). Free to a good home, buyer to collect - or Andrew could deliver if passing. Andrew lives in Surrey.

E: **andrewj.bowden@btinternet.com**

IN MEMORIAM WWW.GEOLSOC.ORG.UK/OBITUARIES

THE SOCIETY NOTES WITH SADNESS THE PASSING OF:

Bishopp, David *
Colley, H *
Davis, Robert Vincent *
Flood, Raymond Edward *
Gorsline, Donn *
Grinly, David *
Haddow, Douglas *
Hawkins, Alfred Brian *
Kilpady, Sripadrao *
Ludford, Albert *
McNicholas, J B *
Plant, Jane
Terris, Alexander P *
Theokritoff, George *
Wood, Christopher J *

In the interests of recording its Fellows' work for posterity, the Society publishes obituaries online, and in *Geoscientist*. The most recent additions to the list are shown in bold. Fellows for whom no obituarist has yet been commissioned are marked with an asterisk (*). The symbol § indicates that biographical material has been lodged with the Society.

If you would like to contribute an obituary, please email **ted.nield@geolsoc.org.uk** to be commissioned. You can read the guidance for authors at **www.geolsoc.org.uk/obituaries**. To save yourself unnecessary work, please do not write anything until you have received a commissioning letter.

Deceased Fellows for whom no obituary is forthcoming have their names and dates recorded in a Roll of Honour at **www.geolsoc.org.uk/obituaries**

Geoscientists in the news and on the move in the UK, Europe and worldwide

DISTANT THUNDER *Changing climate*

As geologist and science writer Nina Morgan* attitudes about climate change are changing

As the world celebrates the signing of the historic agreement in Paris in December 2015, which sets out a global action plan to limit global warming to well below 2°C, it is sobering to recall that as recently as the 1980s, the UK Department of Energy (DoE) was extolling the advantages a 2°C rise in temperature would have for Britain, and proposing an innovative way to achieve it.

In full-page advertorials published in 1986 in both Times and Guardian, the DoE announced that following a review of national energy policy, the Government planned to implement far-reaching strategic energy measures with the aim of effecting a shift in the Earth's axis. This was to be achieved by the carefully timed activation of three five-hundred-megaton electromagnets orbiting the Earth at a velocity of two Earth orbits per hour. The electromagnetic charges generated would act to tilt the Earth's magnetic axis.

Heading south

The result, government scientists predicted, would be to shift Britain to a new geographical location just 10 degrees north of the equator. As a result, British summers, on average, would be 10°C warmer, while winter temperatures would be maintained at a balmy 20°C. This change in the British climate, DoE estimated, would generate energy savings estimated at £2bn per year. Admittedly, the effects of an axis shift might not be so favourable in regions such as Southern Africa, which would become the new South Pole, or in Japan and parts of China, which would then form the new North Pole. But a DoE spokesperson argued: " Britain is long overdue some good weather and energy savings. And anyway why shouldn't someone else suffer for a change?"

COP21 – not, we trust, another joke

In the end – some would say disappointingly – the UK government opted to support more conventional technologies, such as draught-proofing, pipe lagging and insulation, in a bid to make the British indoor climate feel more Mediterranean. As a result, the axis-shifting scheme was never implemented.

Cost cutting

The reason for this change of heart, it is claimed, was partly cost. Cost, of the placing the advert, that is. The bill for publishing the advertorial outlining the scheme reportedly ran to £18,000 – an amount Stan Orme MP, then shadow energy secretary, characterised as 'an outrageous expenditure of public money'. But perhaps he missed the point. The warming effect of the smiles generated by an article about energy policy ending with the words 'April Fuel', should never be underestimated!

Acknowledgement
Sources for this vignette include: **http://hoaxes.org/af_database/permalink/earths_axis_shifted** and **http://ec.europa.eu/clima/news/articles/news_2015121201_en.htm**

***Nina Morgan** is a geologist and science writer based near Oxford. Her latest book, The Geology of Oxford Gravestones, is available via www.gravestonegeology.uk

Mind the Gap!

Peter Worsley is organising a special rail and river field excursion to the Goring Gap.

Separating the Chilterns chalk from the Berkshire Downs chalk, Goring Gap is arguably the most impressive fluvial landform in Britain. From the Jurassic lowlands around Oxford, the River Thames flows anomalously across the Chalk upland of the Chiltern Hills/Berkshire Downs via 'The Gap' and then enters the London Basin, initially onto the Lower Tertiary (Lambeth Group) in the Reading area.

In 1895 the Geologists' Association (GA) held an 'Excursion to the Goring Gap' under the leadership of Survey geologists William Whitaker and J F Blake (Proc. Geol. Ass. 14, 175-6). The GA party of 50 arrived at Reading Station and walked to the river at the Thames Promenade where they embarked on the steam-launch Fashion. This took them up river to Goring through the incised stretch of the Thames. There they walked west into Berkshire and climbed Streatley Hill before returning to Goring in Oxfordshire. They boarded the launch again and sailed upstream a little before returning to Reading. It is proposed to repeat the 1895 excursion as precisely as possible.


Sweet Thames runs softly through the Goring Gap

The 2016 excursion will commence at Reading railway station on June 11, which is 10-15 minutes' walk from the same landing stage as used in 1895. The 'Caversham Princess' has been chartered for the day and will be available for boarding from 09.30. The vessel has ample space and both decks are covered. There is a bar with real ale and other drinks. Scenically this reach is undoubtedly the finest on the entire Thames. Departure is scheduled for 10.00 and the initial journey will take between 2 - 2.5 hrs (two locks have to be passed).

The excursion will welcome all geoscientists and partners. They do not have to be members of the GA. Tickets are £25 per person. Booking details are to follow. For more information, W: **www.geologistsassociation.org.uk/ukfield.html**

OBITUARY BRIAN DOUGLAS HACKMAN 1933-2015

IGS/BGS geologist, fluent in eight languages, who worked widely on British Aid projects overseas

Brian Hackman, who died on 5 November 2015 after suffering with dementia for several years, was an international geologist, with a passion for languages, eight of which he spoke fluently.

He graduated from the Royal School of Mines in 1955 and after two years in the Royal Engineers, he joined the Colonial Service. His first job was in the British Solomon Islands Protectorate where he became an authority on the geology of Guadalcanal mapping over 3000 square kilometres of rugged, thickly forested terrain with a complex, island-arc sequence of rock types. This work led to the award in 1971 of a PhD by the University of Western Australia.

Plane crash

He spent 10 years in Solomon Islands and, in 1972, chose to travel home via Ethiopia where he was seriously injured in a plane crash. After several months in hospital he joined the Institute of Geological Sciences, as the British Geological Survey was then known, and was immediately seconded back to the Department of Geological Survey, Solomon Islands where he eventually became Chief Geologist.

He stayed with IGS/BGS for just over 20 years working mainly on British Aid projects overseas. After a short, geothermal investigation in St Lucia he became the leader of the first phase of a mapping and geochemical exploration project in the Western Solomons. Most of the team had very little experience of the harsh terrain and Brian's knowledge was invaluable in helping them to adapt.

In northern Kenya Brian led The Samburu-Marsabit Project to map and explore 100,000 square kilometres of metamorphic rocks of the Mozambique Belt and overlying Cainozoic volcanics. The project was commended by an independent review body as significantly contributing to Kenya's economic growth in its mineral sector.

> "WHEREVER HE FOUND HIMSELF, HIS WARMTH, WIT, SKILL AS A STORYTELLER AND HUMOUR TOUCHED PEOPLE AND HE IS MISSED BY MANY"

Towards the end of his time with BGS Brian's skill with languages was recognized and he was posted first to Malaysia and then to Indonesia to assist local geoscientists with the writing and computer editing of technical reports.

He was attached to the Geological Survey of Malaysia to set up an editorial and publications unit and to help train counterparts to run it. Brian became a prominent and well-liked member of the Survey, quickly adopting a role of father-figure because of his willingness to listen to his counterparts and other Survey staff when they faced problems.

Editing

Brian's final overseas assignment was to a hydrocarbon assessment project in the Indonesia Research and Development Centre for Oil and Gas Technology (LEMIGAS). A multidisciplinary study of the North Sumatra Basin (NSB) was the principal focus and Brian's role was to enhance the writing and editing skills of LEMIGAS staff. His final contribution, and legacy, was to edit and see through to publication the two-volume Project Report.

Wherever he found himself, his warmth, coupled with his wit, skill as a storyteller and a well-developed sense of humour, touched people and he is missed by many.

By **Rodney Walshaw** with the assistance of **David Bate, Clive Jones, Roger Key, Sandy Macfarlane, John Ridgeway** and others.

HELP YOUR OBITUARIST The Society operates a scheme for Fellows to deposit biographical material. The object is to assist obituarists by providing contacts, dates and other information, and thus ensure that Fellows' lives are accorded appropriate and accurate commemoration. Please send your CV and a photograph to Ted Nield at the Society.

CAN'T FIND YOUR MEETING? VISIT WWW.GEOLSOC.ORG.UK/LISTINGS FULL, ACCURATE, UP-TO-DATE

ENDORSED TRAINING/CPD

COURSE	DATE	VENUE AND DETAILS
Lapworth's Logs	n/a	'Lapworth's Logs' is a series of e-courses involving practical exercises of increasing complexity. **Contact:** info@lapworthslogs.com. Lapworth's Logs is produced by Michael de Freitas and Andrew Thompson.

DIARY OF MEETINGS EVENTS 2016

MEETING	DATE	VENUE AND DETAILS
The Roberts Conference: Passive Margins 2016 Royal Holloway	6-8 April	**Venue:** Royal Holloway TW20 0EX, Windsor Bldg. Contact **E:** passivemargins2016@es.rhul.ac.uk See Website at **W:** fdrg.rhul.ac.uk/passivemargins2016/
Spireslack Opencast Coal Site Fieldtrip: East Ayrshire Geology in 3D Central Scotland Regional; ICE Scottish Geotechnical	9 April	**Venue:** Meet at Bill Shankley Memorial at Glenbuck in Ayrshire, 10.00hrs. **Leaders:** Dr Graham Leslie and Mike Browne, British Geological Survey. Limited to 20, FCFS. See website for details **W:** http://www.geolsoc.org.uk/centralscotland
On-Shore Pipeline Geohazards W S Atkins	12 April	**Venue:** W S Atkins Ltd offices, Woodcote Grove, Epsom. **Time:** 1800 for 1830. **Contact:** Sarah Cook **E:** sarahcook@rocketmail.com
Rock Slope Stability Case Study West Midlands Regional	12 April	**Venue:** New Earth Imaging Laboratory, University of Birmingham. Evening meeting, speaker Richard Small. Time 1800 for 1830. Register: **E:** geolsoc_wmrg@live.co.uk
East Africa: From Research to Reserves Petroleum Group	13-15 April	**Venue:** Burlington House. Conference. Fees apply. See website for details and registration. Contact Laura Griffiths, Conference Office, E: laura.griffiths@geolsoc.org.uk
Crag End Landslide, Rotherbury North West Regional	14 April	**Venue:** The Swan, Newton-le-Willows. **Time:** 1830. Speaker: Paul Berry (Atkins). Contact: Nik Reynolds E: geologicalsociety.northwest@gmail.com
Field Excursion to Cyprus (Greek Sector) Geol. Ass.	16-23 April	**Leader:** Costas Xenophontos. Half board cost estimated £1200 pp. Register with Sarah Stafford, **E:** geol.assoc@btinternet.com
General Assembly 2016 EGU	17-22 April	**Venue:** Vienna, Austria. Society involved in two sessions, on water and geoethics. See website for details. Contact: Nic Bilham **E:** nic.bilham@geolsoc.org.uk
In situ or laboratory Based Testing - Have we got the right balance? Engineering Group	19 April	**Venue:** Burlington House. See website for details. Time: 1730 for 1800. Contact: Matthew Baldwin E: matthew.baldwin@soil-engineering.co.uk
Annual Conference 2016 CIWEM	20-21 April	**Venue:** Royal Geographical Society, London. **Theme:** 2015 Paris Climate Change Summit: Outcomes and Implications for the Water and Environment Sector. See website for details. Contact: Sophie Dunajko **E:** events@ciwem.org
Measuring and monitoring coastal landslides and soft cliff recession Southern Wales Regional	20 April	**Venue:** Cardiff University LT1.40. **Time:** Evening meeting. **Speaker:** Peter Hobbs, BGS. Contact: E: swales.rg@geolsoc.org.uk
The Water Book Geological Society London Lecture	20 April	**Speaker:** Alok Jha. See advert, page 6 for details
Schools A-level Lecture Series North West Regional	23 April	Course, workshop, lecture. **Venue:** Manchester University. **Time:** 0900. See website for details. Contact **E:** geologicalsociety.northwest@gmail.com

OBITUARY WILLIAM JOHN FRENCH 1934-2015

World expert in concrete studies, stalwart of the GA and founder of Geomaterials Research Ltd.

French was born on 17 August 1934 and graduated First Class in Geology at Nottingham University in 1956 under Professor WD Evans and often told stories of Evans's bizarre and exciting experiments.

Bill did postgraduate research at King's College London under Wally Pitcher, studying the lamprophyres, intrusion breccias and appinitic bosses around the Ardara pluton, Co. Donegal, which he concluded were petrogenetically related to the pluton. He was a Research Demonstrator in Cardiff in 1959–61 during which he completed his PhD. In 1961 he became an Assistant Lecturer in the Geology Department, Queen Mary College London (QMC), teaching petrology and remained at QMC until retirement, becoming a Lecturer and Senior Lecturer and a teacher in the Geomaterials taught MSc.

Geomaterials

In 1983 the Department dissolved, part joining Geography as an Applied Earth Science Group with Bill as Director and he continued as Director when the Group moved to the Engineering Faculty as the Geomaterials Unit in 1988. In 1992 he stood down as Director but still taught until 1998.

Bill became a Fellow in 1957, was a Secretary (1982–5) and Treasurer (1985–9) of the Society and was, with Robin Cocks, a strong supporter of the then President, Leake, in making the Society its own publisher in 1987, finding the capital to buy the premises in Bath.

> BILL'S MAIN CONTRIBUTION WAS IN CONCRETE STUDIES. HE BECAME AN EXPERT ON ITS CORROSION AND SET UP GEOMATERIALS RESEARCH LTD. TO UNDERTAKE ASSESSMENTS OF STRUCTURES

Bill served the Geologists' Association (GA) faithfully and enthusiastically for decades, being General Secretary 1978–82, President, 2002–04 and was on its Council and serving in many roles for ~30 years, receiving the Foulerton Award in 1986. He and Clive Bishop saved the GA in 1978 (and Douglas Grant the Proceedings) in its financial crisis when, four sets of membership records, scattered around the country, all incomplete, revealed some members still paying £1 a year by standing order - when this had not been the subscription for 19 years! This situation had arisen from having no office or any staff - remedied in 1979 when the Society first rented an office to the GA. In 2002, Bill was pivotal in launching the new GA Magazine as he did all the computer typesetting for the initial volumes.

Concrete

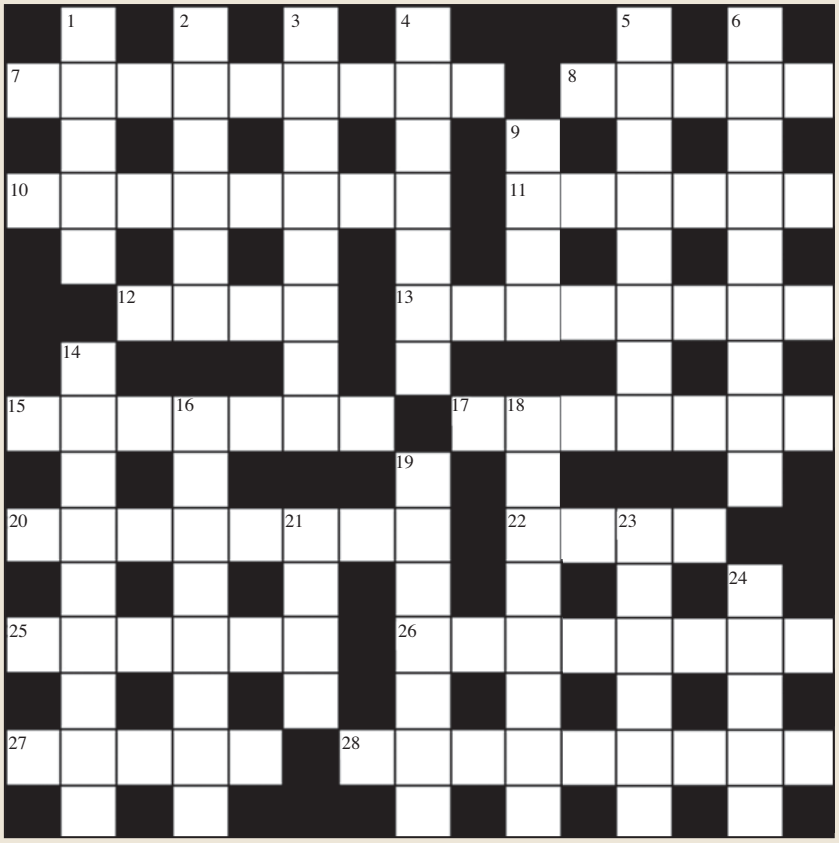
Bill's main contribution was in the important field of concrete studies. He became an expert on concrete corrosion and, while retaining his academic post, with Alan B Poole and E Vivian Tucker (and QMC approval), set up the firm Geomaterials Research Ltd in Billericay (where he lived) to undertake assessments of bridges and other concrete structures suffering corrosion and requiring remedial action. He undertook substantial research into the mechanisms of concrete breakdown, which he taught in Applied Mineralogy and in the Geomaterials MSc course. On retiring in 1998, the firm was given to its employees.

He died on 1 November 2015 leaving a son, Roland James and a daughter, Caroline Elizabeth (by his first wife, Valera Vida d.1988), two granddaughters, Chloe and Emma, and his second wife, Joan, who is thanked for providing information.

By **Bernard Elgey Leake, Clive Bishop** & **Alan Poole**

HELP YOUR OBITUARIST The Society operates a scheme for Fellows to deposit biographical material. The object is to assist obituarists by providing contacts, dates and other information, and thus ensure that Fellows' lives are accorded appropriate and accurate commemoration. Please send your CV and a photograph to Ted Nield at the Society.

CROSSWORD NO.201 SET BY PLATYPUS



ACROSS

7 Fine clay formed by in-situ deep weathering of bedrock, esp crystalline ig and met (9)

8 Petroleum as she emerges from her habitat (5)

10 Superficial loose, unconsolidated material comprising, for example, unlithified 7a (8)

11 Graptolitic cups (6)

12 Asian desert (4)

13 US division of the Silurian, over which much water falls (8)

15 3D, full-size or miniature model, usually in a glass case for a museum (7)

17 Toxic element and frequent contaminant of groundwater, esp in Bangladeshi tube wells (7)

20 Largest chronostratigraphic unit (8)

22 First murderer, according to Biblical myth (see 24d) (4)

25 Precipitating cloud (6)

26 Literally, the outpouring of a classical Greek professional performer of epic poetry. How Bohemian! (8)

27 He lost the Greeks their marbles (5)

28 Epoch of the Paleogene Period from c.33.9 million to 23 million years BP (9)

DOWN

1 Very big pores. Big enough to fit a person. (5)

2 Intermittent Spanish creek (6)

3 Posh European mountaineering (8)

4 Selective corrosion, as with polished limestone before acetate peeling (7)

5 Any compound containing the tetroxide ion of 17a (8)

6 Process without transfer of heat (9)

9 Morale-boosting BBC radio comedy 1939-1949, starring Tommy Handley (1,1,1,1)

14 Typical Linnean double monikers (9)

16 A parallelepiped by another name (8)

18 Precipitation reaching the water table and replenishing groundwater supply (8)

19 Gemstone beryl wehose trace chromium and vanadium lend it its green colour (7)

21 The other part of a latch mechanism, one part of which is a staple (4)

23 Arthropod with three pairs of jointed leg (6)

24 Biblical Paradise (and England, according to Shakespeare) (5)

WIN A SPECIAL PUBLICATION!

The winner of the December/January Crossword puzzle prize draw was Ian G Kenyon of St Agnes, Cornwall.

All correct solutions will be placed in the draw, and the winner's name printed in the June 2016 issue. The Editor's decision is final and no correspondence will be entered into.
Closing date - April 18.

The competition is open to all Fellows, Candidate Fellows and Friends of the Geological Society who are not current Society employees, officers or trustees. This exclusion does not apply to officers of joint associations, specialist or regional groups.

Please return your completed crossword to Burlington House, marking your envelope "Crossword". Do not enclose any other matter with your solution. Overseas Fellows are encouraged to scan the signed form and email it as a PDF to **ted.nield@geolsoc.org.uk**

Name .....

.....

Membership number .....

Address for correspondence .....

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Postcode .....

SOLUTIONS FEBRUARY

ACROSS:
7 Nepheline **8** Stour **10** Isostasy **11** Flaser
12 Aldo **13** Erratics **15** Bermuda
17 Glacier **20** Discrete **22** Noah **25** Alpine
26 Limonite **27** Again **28** Palisades

DOWN:
1 Seism **2** Chisel **3** Alkaloid **4** Enzymes
5 Atlantic **6** Tubercles **9** Afar **14** Aetiology
16 Micritic **18** Langmuir **19** Aeolian
21 Eden **23** Anneal **24** Ether

The Geological Society
serving science & profession

Queen's University Belfast

YEAR OF WATER

Groundwater in Fractured Bedrock Environments:

Managing Catchment and Subsurface Resources

10 June 2016 Queen's University, Belfast, Northern Ireland

Across the UK & Ireland, fractured bedrock aquifers have been traditionally regarded as low productivity aquifers, with only limited relevance to regional groundwater resources. But it has been increasingly recognised that these complex bedrock aquifers can play an important role in catchment management and subsurface energy systems.

In many scenarios, a robust understanding of fractured bedrock environments is required to assess the nature and extent of connectivity between such energy & storage systems at depth and overlying receptors in the shallow subsurface or above ground.

Convenors:

Dr. Ulrich Ofterdinger (Queen's University Belfast)
Prof. Alan MacDonald (BGS)
Dr. Jean-Christophe Comte (University of Aberdeen)
Mike Young (The Geological Society)

Further information:

T: 0207 434 9944
E: georgina.worrall@geolsoc.org.uk
www.geolsoc.org.uk/fracturedbedrocks
Follow this event on Twitter: @geolsoc #fracturedbedrocks #yearofwater

Conference Focus:

This conference will focus on the role of fractured bedrock aquifers in catchment management and in managing subsurface resources.

Event Partners: HG, GSI, Geological Survey of Northern Ireland

THE JANET WATSON MEETING 2016

The Geological Society
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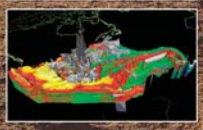
PETROLEUM GROUP

shell badley ashton DONG energy

The Future of Hydrocarbon Exploration



27–28 April 2016

The Geological Society, Burlington House, London

The future of the Hydrocarbon Exploration Industry is changing. Over the past few years conventional discoveries have decreased in volume and are now typically challenged by complexity and location. In their place alternative and unconventional sources of energy are rapidly developing while the price of oil has fallen dramatically and the exploration industry is undergoing a significant change in its experience demographic. A new generation of geoscientists is now at the forefront of the many challenges facing the exploration industry.

This two day meeting will bring together early career geoscientists with leading industry and academic experts to discuss and showcase recent and potential future innovations in hydrocarbon exploration geoscience. This will be an excellent forum for networking and an opportunity for graduate students and young professionals to present their research. The conference offers more experienced hydrocarbon exploration geoscientists new research, ideas and concepts, plus the chance to add their experience to a panel discussion.

Confirmed Keynote speakers include:

Al Fraser (Imperial College)
Robert Hall (Royal Holloway)
Gary Nichols (Nautilus)
Jenny Omma (Henrik Omma)
Bryan Ritchie (BP)
Zoe Shipton (University of Strathclyde)
Mike Simmons (Halliburton)
Dirk Smith (Shell)
John Underhill (Heriot Watt University)
Oonagh Werngren (Oil and Gas UK)

Convenors:

Isobel Sides (Halliburton-Landmark)
Mike Cottam (BP)
Caroline Gill (Shell)
Lucy Slater (Actis Oil & Gas)
Helen Smyth (Halliburton-Landmark)

Further information:

For further information about the conference please contact:
Naomi Newbold, Conference Office, The Geological Society, Burlington House, Piccadilly, London W1J 0BG
T: 0207 434 9944
E: naomi.newbold@geolsoc.org.uk
Web: www.geolsoc.org.uk/jwatson16
Follow this event on Twitter: #gsljwatson16

Conference themes:

- The challenges of career development at $50 oil
- Adapting established techniques to enhance exploration potential
- Building effective links between Industry and Academia
- The Future Exploration Toolbox: New techniques and software solutions

A panel discussion on 'The Future of Hydrocarbon Exploration' will be chaired by Prof. John Underhill (Heriot Watt University)

The Geological Society
serving science & profession

Event Partner: LUNAR AND PLANETARY INSTITUTE

Martian Gullies and their Earth Analogues

20-21 June 2016

The Geological Society, Burlington House

This meeting follows on from the original workshop on martin gullies held in 2008 at LPI in Houston Texas. This happened 8 years after their first discovery and formed a focal point for researchers studying gullies through remote sensing, fieldwork studies of Earth analogues and laboratory simulation studies.

The aim of this second workshop would be not only to bring together the plethora of researchers involved in gully-research on Mars, but also to add a wider perspective by including contributions from those studying analogous environments on Earth. Such as, geomorphologists, sedimentologists glaciologists, hydrologists, climatologists, soil scientists and mineralogists/petrologists.

We would particularly encourage Earth Scientists working on sites or topics which could be considered as informative analogues for water on the Martian surface. These wider perspectives add both depth and context, allowing researchers not traditionally attached to gully-research to add their outside expertise to the ongoing debate.

Convenors:

Susan Conway (Open University)
Jonathan Carrivick (University of Leeds)
Paul Carling (University of Southampton)
Allan Treiman (LPI)

Further information:

For further information about the conference please contact:
Georgina Worrall, Conference Office, The Geological Society, Burlington House, Piccadilly, London W1J 0BG
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YEAR OF WATER

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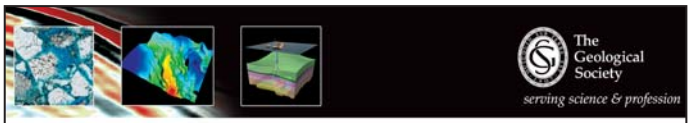
Images courtesy of: Background – Susan Conway. From left-right: NASA/JPL/UofA (x2), NASA/JPL/UofA/OpenUrs, Dennis Reiss.



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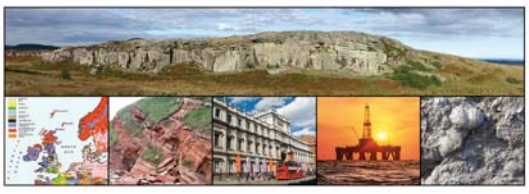
Palaeozoic Plays of Northwest Europe

26-27 May 2016

The Geological Society, Burlington House, Piccadilly, London



Palaeozoic hydrocarbon plays in NW Europe remain relatively under-explored, both on- and offshore, despite the great success of local plays such as the Carboniferous and Permian in the southern North Sea. There is renewed momentum to understand and explore these plays further, including for example the joint-industry Palaeozoic Project, part of the UK Industry/Government's "21st Century Exploration Roadmap" initiative.

This Petroleum Group conference is intended to bring together new and existing knowledge about the Palaeozoic in NW Europe. Themes will include, but are not limited to:

- Palaeozoic exploration plays
- Palaeozoic source rocks
- Existing oil and gas field examples
- Outcrop analogues
- Palaeozoic shale oil and gas
- Pre-Mesozoic fractured plays

For further information and registration please contact:

Laura Griffiths, The Geological Society, Burlington House, Piccadilly, London W1J 0BG.
T: +44 (0)20 7434 9944 or email: laura.griffiths@geolsoc.org.uk or visit the conference webpage: www.geolsoc.org.uk/PG-Palaeozoic-Plays-of-Northwest-Europe

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