

# GEOSCIENTIST

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The Fellowship Magazine of the Geological Society of London

 @geoscientistmag

[GEO-NEWS YOU MAY  
HAVE MISSED!]

## BRAVE NEW WORLD

Are online conferences transforming  
how we communicate research?

### SECURING OUR FUTURE

Mike Daly on the past and future  
of the Geological Society

### THE SONG OF THE ICE

Using music to tell the story  
of the Antarctic ice sheet

### MINE THE GAP

Why mining is crucial in  
achieving net zero



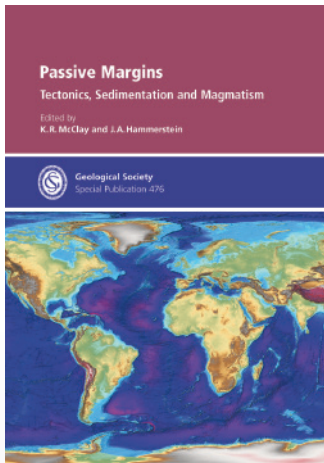
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Geological Society publications online

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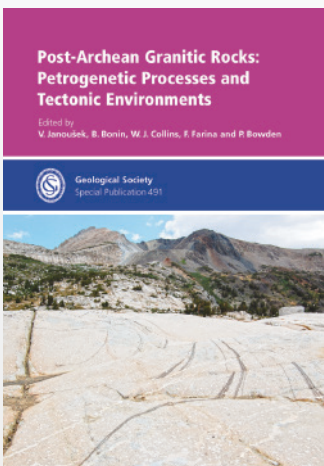


## Passive Margins: Tectonics, Sedimentation and Magmatism

Edited by K.R. McClay and J.A. Hammerstein

This volume has evolved from papers written in memory of Professor David Roberts. They summarize the key findings of recent research on passive margins, from tectonics, bathymetry, stratigraphy and sedimentation, structural evolution and magmatism.

View on the online bookshop: [www.geolsoc.org.uk/SP476](http://www.geolsoc.org.uk/SP476)

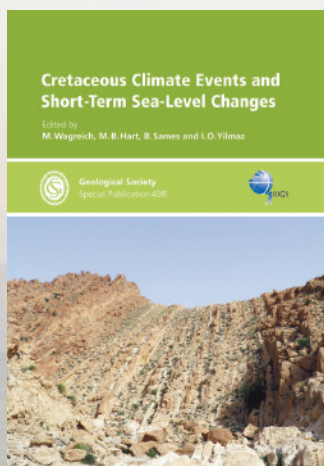


## Post-Archean Granitic Rocks: Petrogenetic Processes and Tectonic Environments

Edited by V. Janoušek, B. Bonin, W.J. Collins, F. Farina, and P. Bowden

Granites (*sensu lato*) represent the dominant rock-type forming the upper-middle continental crust but their origin remains a matter of long-standing controversy.

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## Cretaceous Climate Event and Short-Term Sea-Level Changes

Edited by M. Wagnreich, M. B. Hart, B. Sames, and I. O. Yilmaz

Sea-level constitutes a critical planetary boundary for geological processes and human life. Sea-level fluctuations during major greenhouse phases are still enigmatic and strongly discussed in terms of changing climate systems.

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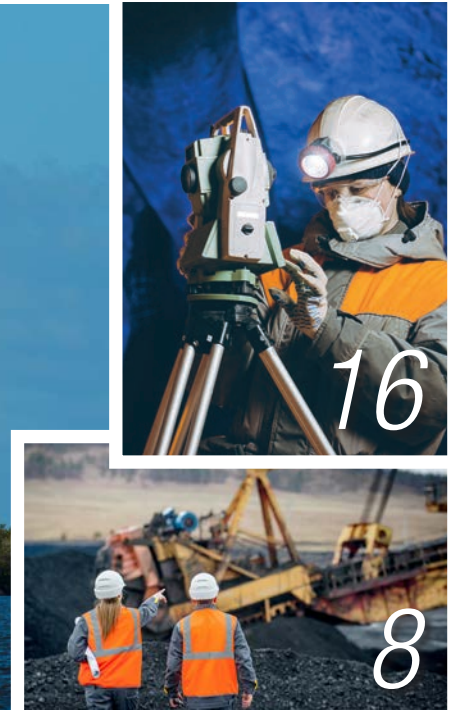
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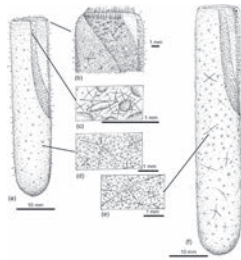
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## Latest news from the Publishing House

### Exceptional preservation of two new early rosselid sponges: the dominant species in the Hirnantian (Late Ordovician) Anji Biota of China

By Joseph P. Botting, Dorte Janussen, Yuandong Zhang and Lucy A. Muir

The Anji Biota of Zhejiang Province, South China, is an exceptionally preserved, sponge-dominated fauna from the latest Ordovician interval, representing a deep-water environment and containing more than 100 sponge species. Herein a complex of two common species that together dominate the deepest-water sponge assemblages within the sequence are described: *Shouzhispongia coronata* gen. et sp. nov. and *Shouzhispongia prodigia* gen. et sp. nov.



Read the full paper on the Lyell Collection:  
[jgs.lyellcollection.org/content/early/2020/06/11/jgs2020-002](https://jgs.lyellcollection.org/content/early/2020/06/11/jgs2020-002)

### Fault geometry, segmentation and slip distribution associated with the 1939 Erzincan earthquake rupture along the North Anatolian fault, Turkey

By Ömer Emre, Hisao Kondo, Selim Özalp and Hasan Elmacı

The intracontinental plate boundary, dextral North Anatolian fault (NAF), is well-known by the westward migration of the multi-segment large earthquake sequence during the twentieth century. The sequence, started by the 1939 Erzincan earthquake (Mw 7.9), resulted in a 330 km-long multi-segment surface rupture. Slip magnitudes are relatively consistent on each segment, with averages per segment slip varying from 2.3 to 8.8 m, with maximum horizontal displacements up to 10.5 m.



Read the full paper on the Lyell Collection:  
[sp.lyellcollection.org/content/early/2020/05/29/SP501-2019-141](https://sp.lyellcollection.org/content/early/2020/05/29/SP501-2019-141)

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**Geoscientist** is the official membership magazine of The Geological Society of London. The society is the recognised UK professional body for geoscientists, and the oldest geological society in the world.

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# “NEWS – AND SCIENCE – HASN'T STOPPED DURING THE COVID-19 CRISIS, BUT IT HAS BEEN SOMEWHAT OVERSHADOWED”

FROM THE EDITOR'S DESK:

## LIFT OFF!

It took a historic space launch – the first time a private vehicle has carried astronauts to the International Space Station – to break through the gravitational field of coronavirus news. The launch of the Falcon 9 rocket and Dragon crew capsule in late May was a welcome relief from what is still a fairly relentless news cycle and – whatever your thoughts on space programme spending, and SpaceX's controversial founder – an undeniably positive news story.

News – and science – hasn't stopped during the Covid-19 crisis, but it has been somewhat overshadowed. You can't have missed the SpaceX news, but you could be forgiven for missing, for example, the discovery of 90 million year old tree roots in Antarctica (early April), the news that the North magnetic pole's wanderings might be caused by two 'metallic blobs' on the surface of the core (early May), or the discovery of fossil tracks from the early Cretaceous that suggest some ancient crocodiles may have moved around on two feet and 'run like ostriches' (early June).

Among my favourite of the geology stories that, thanks to coronavirus, might not have received the attention they deserve, was the international team of researchers who revealed in May that simulated Martian mud volcanoes flow 'like boiling toothpaste.' The surprising discovery was made by an international team of researchers whilst, according to the BBC, 'playing with muck in the laboratory.'

Whilst research has continued, the challenge of how to hold conferences remains. In this month's issue, Cathy Hollis, Stephen

Lockier and colleagues recount how a successful international meeting was held remotely in the midst of lockdown, and argue that we need to rethink how international conferences work – an opportunity that could bring many benefits alongside inevitable challenges.

Meanwhile, after the success of SpaceX we have another launch to look forward to, in the shape of the NASA Mars 2020 mission. The launch window for the aptly named 'Perseverance' rover's journey to Mars opens up on July 30th – no doubt timed to coincide as far as possible with the Geological Society's 2021 Year of Space.

I love a geology news story at the best of times, but particularly now. Unlike a lot of news, it's almost impossible to link geology stories to the current pandemic, and as such they're a welcome escape from an all-consuming news cycle. Astronauts Doug Hurley and Bob Behnken must be feeling even more relieved – there's surely rarely been a better time to temporarily leave the Earth's atmosphere. For those of us left behind, I recommend setting up a Google alert for 'geology' and seeing what pops up.

It's not all a blessed relief, though – in early May, geology and Covid-19 news combined when we learned that the UK lockdown brought about an 'unprecedented seismic quiet', with seismometer stations detecting a significant fall in ground vibrations linked to human activity. Which might not sound very exciting, but it's hoped that this could be a unique opportunity to study seismic activity which is usually – like so many science stories this year - buried amongst the noise.

You (possibly) heard it here first.

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# SOCIETY NEWS

## SOCIETY AWARDS 2021 – DON'T FORGET TO NOMINATE!



**The deadline to submit nominations for the Society's 2021 awards is noon on Wednesday 30 September.**

Please visit <https://www.geolsoc.org.uk/About/Awards-Grants-and-Bursaries/Society-Awards> to find out more about how to make a nomination and view the full criteria for each award.

We are committed to seeing the diversity of our awardees increase, by broadening the demographics of those put forward for our medals and

funds. We are also particularly keen to receive nominations for the funds which recognise excellent contributions by early career geoscientists.

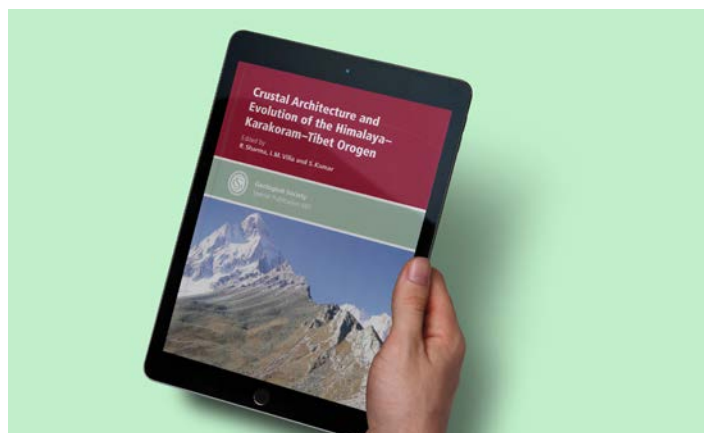
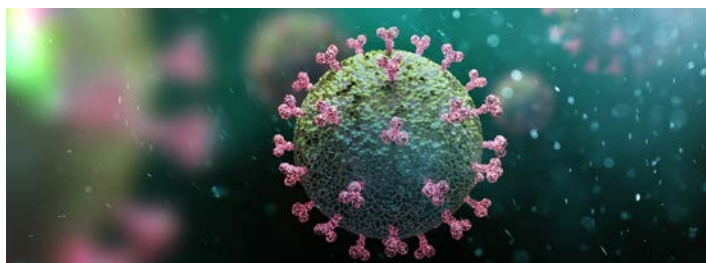
## DEGREE PROGRAMME ACCREDITATION AND THE COVID-19 PANDEMIC

The COVID-19 pandemic has seriously impacted on student fieldwork and a wide range of course work and assessment. This disruption is likely to continue until at least the next academic year, and possibly much longer.

Many of the activities that are affected are core to the accreditation procedure and requirements. However, the Accreditation Committee feels that currently, and in the short term, accreditation should continue to be conferred upon programmes that continue to meet their intended learning outcomes. This recognises that the health and safety of staff and students should at all times take priority.

In the medium and long term, and depending on the progress of return to some degree of normality, the Committee accepts that changes to the accreditation scheme will likely be necessary. This will closely inform the review of Accreditation currently underway by the Society, and we shall need to consult widely with both the higher education (through University Geoscience UK) and employment sectors to effect the best way forwards.

*Andy Saunders (Accreditation Officer), on behalf of the Accreditation Committee*



## GEOLOGICAL SOCIETY OF LONDON JOURNALS ARE GOING ELECTRONIC-ONLY

The Geological Society of London's owned and co-owned journals will move to electronic-only publication from January 2021. This means that Journal of the Geological Society, Quarterly Journal of Engineering Geology and Hydrogeology, Petroleum Geoscience and Geochemistry: Exploration, Environment, Analysis will cease appearing in print. Print copies will continue to be produced for other journal titles and books, including Geological Society of London Special Publications.

The popularity of the Society's journals continues to increase and the restrictions of a print-led publication model are adversely impacting the service and experience for authors. The removal of print will be accompanied by a move to a continuous publication model that will allow the authoritative version of articles to be published more quickly.

Alongside modernization of the Society's publications and improvements to author service, there are compelling environmental reasons to cease printing journals and so help to reduce the Society's carbon footprint. We appreciate that this might be disappointing to those Fellows who opt to pay for a print copy. Information on how to access your chosen online journal(s) can be found here: <https://www.geolsoc.org.uk/fellowsaccess>

*Maggie Simmons, Director of Publishing*

## CODE OF CONDUCT

At its June 17th 2020 meeting the Council approved amendments to Regulation FP/7, 'Codes of Conduct'. Previous versions of this regulation defined the standards of behaviour, ethics and practice expected of Fellows in the course of their professional duties, but not when acting in personal capacities. The amended Regulation (see <https://www.geolsoc.org.uk/regulations>) sets out the standards of conduct expected of fellows acting in both professional and personal capacities, and aligns the Society's Codes of Conduct with best practice at other learned societies and professional bodies.

*Richard Hughes, Executive Secretary*

What your society is doing  
at home and abroad



## PUBLIC LECTURE SERIES

### Virtual Public Lecture: Getting inside the heads of early vertebrates

**Speaker:** Sam Giles, University of Birmingham

**Location:** Online **Date:** 2 September **Time:** 2.30pm BST

#### Further information

The lecture will be streamed online using Zoom.

To book your virtual ticket, and for more information, please visit

<https://www.geolsoc.org.uk/earlyvertebrates>

Contact: [conference@geolsoc.org.uk](mailto:conference@geolsoc.org.uk)

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T: +44 (0) 20 7434 9944 E: [conference@geolsoc.org.uk](mailto:conference@geolsoc.org.uk)

## CORONAVIRUS UPDATE

As a consequence of the continuing impacts of the COVID-19 pandemic, the Society's offices at Burlington House and Bath will remain closed until 31 August 2020. All events and venue hire bookings are postponed or cancelled in line with Government advice. We hope to be able to reopen in early September, and the general situation and current closure arrangements will be reviewed in early August.

Please check our events page ([www.geolsoc.org.uk/events](http://www.geolsoc.org.uk/events)) for the most up to date information. If you have any questions about the Society's response or the services available, please contact us via [enquiries@geolsoc.org.uk](mailto:enquiries@geolsoc.org.uk).

For Fellowship/Chartership enquiries, please contact [membership@geolsoc.org.uk](mailto:membership@geolsoc.org.uk).

## FROM THE LIBRARY

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### E-journals and e-books

Fellows can access 100+ e-journals and 60+ e-books for free using Athens logins. Find out more and see what's available at [www.geolsoc.org.uk/VirtualLibrary](http://www.geolsoc.org.uk/VirtualLibrary)

If you've not signed up for an Athens account please download and email us the registration form from [www.geolsoc.org.uk/AthensAccess](http://www.geolsoc.org.uk/AthensAccess) or contact us on [library@geolsoc.org.uk](mailto:library@geolsoc.org.uk)

### Online Library and Archive catalogues

Search the online catalogue of books, journals and maps held in the Geological Society Library and explore our archive collection: [www.geolsoc.org.uk/librarycatalogue](http://www.geolsoc.org.uk/librarycatalogue) [geolsocarchives.org.uk](http://geolsocarchives.org.uk)

### Looking for information? Get in touch

We are able to help with:

- Research/Enquiries - as well as helping with the Library's electronic resources we can advise where to find material. We are able to access some resources in addition to what you might find yourself online
- Inter-Library loans - if you would like to borrow a book or access a paper from a journal we don't subscribe to, please let us know and we will try and source it from elsewhere. Just ask!
- Database searches - we can search the GeoRef and Geofacets databases on your behalf and send you lists of references

### Additional online resources during COVID-19 closure

We have created a new page on our Virtual Library bringing together extra online resources which a number of publishers and organisations have made available to support the geoscience community at this time. Find out more at [www.geolsoc.org.uk/Library-and-Information-Services/Virtual-Library/additional-online-resources-covid-19](http://www.geolsoc.org.uk/Library-and-Information-Services/Virtual-Library/additional-online-resources-covid-19)

### Postal Loans and Document Supply

We have resumed our postal loan and document supply services for Fellows and Corporate Patrons. While Burlington House remains closed, staff will go into the Library once a week to process requests for loans and scans of articles. Find out more at [www.geolsoc.org.uk/PostalLoans2020](http://www.geolsoc.org.uk/PostalLoans2020)

### New Picture Library galleries

We have recently added two new galleries to our Picture Library of images from our historical collections. The Visions of Lost Worlds gallery presents a unique view of the primeval past as envisaged in the 19th Century, while Buildings contains photographs of geologically significant buildings including the GSL Library and Charles Darwin's home at Down House. View the galleries at [www.gslpicturelibrary.org.uk](http://www.gslpicturelibrary.org.uk)

### Library newsletter

Subscribe to our bi-monthly newsletter to keep up-to-date with important Library news, electronic resource updates, online exhibitions, events and more – sign-up at [www.geolsoc.org.uk/newslettersignup](http://www.geolsoc.org.uk/newslettersignup) or email [library@geolsoc.org.uk](mailto:library@geolsoc.org.uk) and we will add you to our mailing list.



# Mine the Gap

The coming net-zero carbon revolution will entail a lot more mining. Geologists need to be able make the case for this, at home and abroad, says **Christopher Brough**

**T**he industrial revolution paved the way for huge advances in the standard of living across the world. Globally, we now face a different challenge: the need to reach net zero carbon by 2050 to avert or minimise the worst effects of climate change.

The switch to net zero carbon will require wholesale transfer of energy production from carbon sources to renewable sources (solar, wind, wave, geothermal). It will also entail a revolution in the automotive sector as all vehicles, from private to public to haulage, become powered by lithium-ion (Li-ion) battery technology.

Mining will be crucial to meeting these challenges, as we source the material for the new energy mix and Li-ion batteries. Geologists will need to make the case for an industry which currently has a negative reputation amongst the public, particularly with respect to environmental issues, and is often only reported in terms of its capacity for exploitation and damage.

## Recyclability gap

Renewable energy sources and Li-ion batteries are more material intensive than their carbon counterparts, which entails a huge increase in material demand. Estimations vary, from an increasing demand of hundreds of percent to thousands for several critical metals such as copper, lithium, graphite and cobalt. For some elements, this could mean the amount we need to mine over the next 25 years will be equivalent to the sum total extracted over the course of human history.

It remains to be seen how much of this can be supplied by improved recycling and a circular economy, but there is no version of the future that will not involve

substantially upscaling the extraction of the materials we need.

## Skills gap

Whilst I was undertaking further education my then supervisor was responsible for running the exploration and mining course;



consistently one of the most popular to attend as students saw the practical benefit and job opportunities involved.

University courses like these are going to become increasingly important. The skillsets required to start a mine are diverse, from exploration for the raw material to obtaining a social license to operate and the requisite stakeholder engagement. From mineralogists to engineers to hydrologists, our universities

are going to need to train up a next generation capable of practically meeting the extractive demands of the net zero target.

## Transport gap

Currently, the supply of many of these elements requires a complex globally linked chain totalling tens of thousands of kilometres back and forth. Reaching the net zero target will require shortening these chains where practicably possible and therefore bringing domestic supply chains and domestic mines back online.

One obviously can't build a mine without a resource to extract, but many European countries, including the UK, still have world class mining districts within their international borders. Part of their extraction will require geologists prepared to make the positive case to general media and the wider public that mining not only exists for the general good of society, but is absolutely integral to reaching our net zero target.

**Christopher Brough is a Senior Consultant Mineralogist at Petrolab Ltd specialising in the application of petrology and mineralogy to the minerals and mining industry. (chris@petrolab.co.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 [sarah.day@geolsoc.org.uk](mailto:sarah.day@geolsoc.org.uk). Copy can only be accepted electronically. No diagrams, tables or other illustrations please.

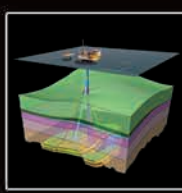
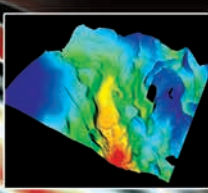
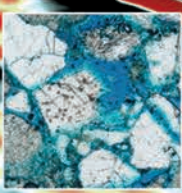
Pictures should be of print quality – please take photographs on the largest setting on your camera, with a plain background.

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).

“THERE IS NO VERSION OF THE FUTURE THAT WILL NOT INVOLVE SUBSTANTIALLY UPSCALING THE EXTRACTION OF THE MATERIALS WE NEED”

**CHRISTOPHER BROUGH**





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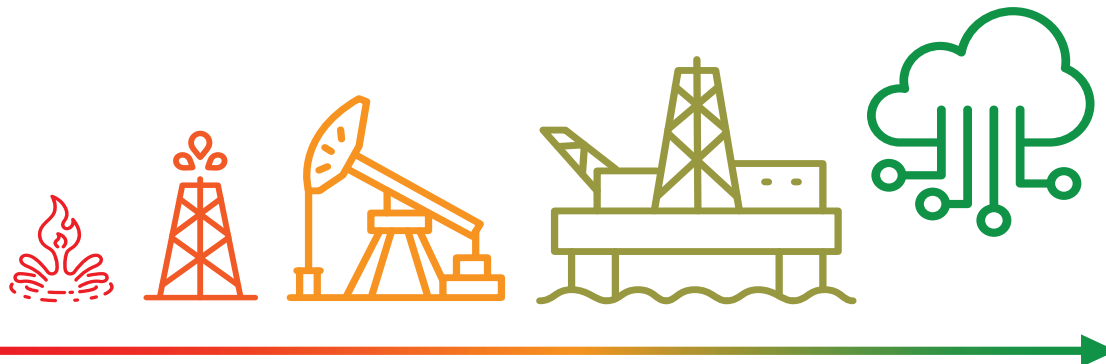
Call for Abstracts – Deadline Extended: 4 September 2020

# Operations Geology in 2020 and Beyond:

## Traditional and modern approaches

4-5 November 2020

Virtual Conference



The key theme of the 5th Operations Geoscience conference is how the role of the Operations Geologist will evolve as the Oil & Gas industry embraces the digital transformation. **Operations Geologists will be at the heart of this transformation** by bringing together digitalisation and geological expertise to improve operational efficiency and promote success.

The organisers invite contributions within **all aspects of Operations Geoscience** with a preferred **focus on emerging technologies and advances in the digital oilfield**.

Suggested themes include:

- **Machine learning and artificial intelligence** applied to planning and drilling a well
- **Digitalisation and “disrupting” current work flows** – can digitalisation and data mining generate additional information that will change the role of the operations geoscientist?
- **New analytical technologies and technological advances** – case studies of e.g. LWD, wireline or modelling solutions as applied during operations
- **PPFG, Geomechanics & surface logging** showcasing innovative approaches and surprising outcomes
- **Managing risks and improving safety**

**Keynote speakers** to be announced soon. **A parallel poster session** will take place in the library during the breaks.

**For further information and abstract submission please contact:**

Abstract Guidelines available on the conference website [www.geolsoc.org.uk/11-pg-ops-geology-2020](http://www.geolsoc.org.uk/11-pg-ops-geology-2020)

Sarah Woodcock, [sarah.woodcock@geolsoc.org.uk](mailto:sarah.woodcock@geolsoc.org.uk)

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# **BRAVE NEW WORLD: ARE ONLINE CONFERENCES TRANSFORMING HOW WE COMMUNICATE RESEARCH?**

Now is the time to rethink our approach to international conferences, say Cathy Hollis, Stephen Lokier and colleagues



**T**he catastrophic COVID-19 global pandemic has forced us all to re-evaluate our lifestyles and adapt our working patterns. We have put many aspects of our lives on hold, and rescheduled events to some future date when a 'new normal' will be established. Many of us have turned to video conferencing to help us remain connected with colleagues, friends and family.

So, what of conferences?

### Vital gatherings

Conferences have long provided fora at which scientists and others gather, share results, discuss scientific advances and build working relationships. These gatherings are central and vital to the working model of academic life and remain an important component of continuing professional development in industry. Some of these meetings are an annual fixed point in our professional calendars, providing a touchstone for research and project planning.

Conferences are a trillion-dollar industry; annual conventions, such as those of the AGU, EAGE and AAPG attract many thousands of delegates to see tens of thousands of presentations and exhibits. Conference presentations are where we road-test our ideas prior to publication, and 'spread the word' about new concepts, models, and techniques. Such interaction facilitates timely publication by garnering feedback, raising awareness and opening pathways for deeper discussion. At a smaller scale, even specialised conferences can see over a hundred people brought together at a single destination. In the best cases, delegates leave conferences relaxed, inspired and enriched, having broadened their scientific outlook, met new people and learnt something new.

Unfortunately, attendance at these events can be very expensive. Registration fees are typically hundreds of pounds or more, and once travel, accommodation and subsistence are included, the cost of a single international meeting can easily exceed £1K. ►

► As distance and time constraints mean that many delegates have no option but to travel by air, the carbon footprint of conferences can also be significant. Most individuals thus face difficult choices about which conferences to attend, with many being limited to attending only one event a year. For those based in more remote or less affluent institutions, or who are resident in nations with travel restrictions, these combined factors may make international conference attendance practically impossible.

We are all hoping to meet again in 2021 at events that have been cancelled this year, but how can we stay in touch scientifically in the meantime, and what is the future for scientific conferences? A recent initiative, aiming to rejuvenate participation in conferences for postgraduate and early career researchers in the field of carbonate sedimentology, was an opportunity to assess the benefits of virtual conferences and showed they have a significant future beyond the current global crisis.

## The Carbonate Forum

In autumn 2019, a group of academic carbonate sedimentologists began to discuss the limited opportunities for postgraduate and early career researchers to present their work to a like-minded audience. We recognised that carbonate sedimentology (Figure 1) has diversified as a discipline, embracing sedimentary, hydrogeological and chemical processes, geobiology, GIS systems, numerical modelling, rock physics, and much more. Many advances in fundamental problems within the discipline, such as dolomitization processes, reconstruction of past climates and prediction of sedimentary architecture, have been made by integration of these different skill-sets (Figure 2).

Nevertheless, there are few conferences where those working across this broad range of topics can come together to discuss and share our knowledge and ideas. In particular, no single forum has specifically given a voice to those scientists at the early stages of their career. These individuals are often at the forefront of scientific advances, are typically custodians of rich, high quality datasets, are embedded in the current literature and have ideas that can be tested.

Bluntly, we recognised that there is an increasing tendency for conference organisers to compete for attendance by preferentially giving a voice to those of us with many years of experience; a practise that is detrimental to the progression of the next generation of scientists and hence negatively impacts the broader scientific community.

To address this need, we invited abstracts for a two day Carbonate Forum scheduled at the University of Manchester on 12-13<sup>th</sup> May 2020 and garnered supported from the International Association of Sedimentologists, the British Sedimentological Research Group and the Society for Sedimentary Geology.

## Maximising engagement

From the outset, the meeting was committed to featuring presentations from postgraduate researchers and early-career scientists (individuals with no more than seven years of experience or part-time equivalent since award of their PhD, excluding periods of parental/ care leave) and to keeping attendance costs to an absolute minimum. To maximise engagement, we stipulated that

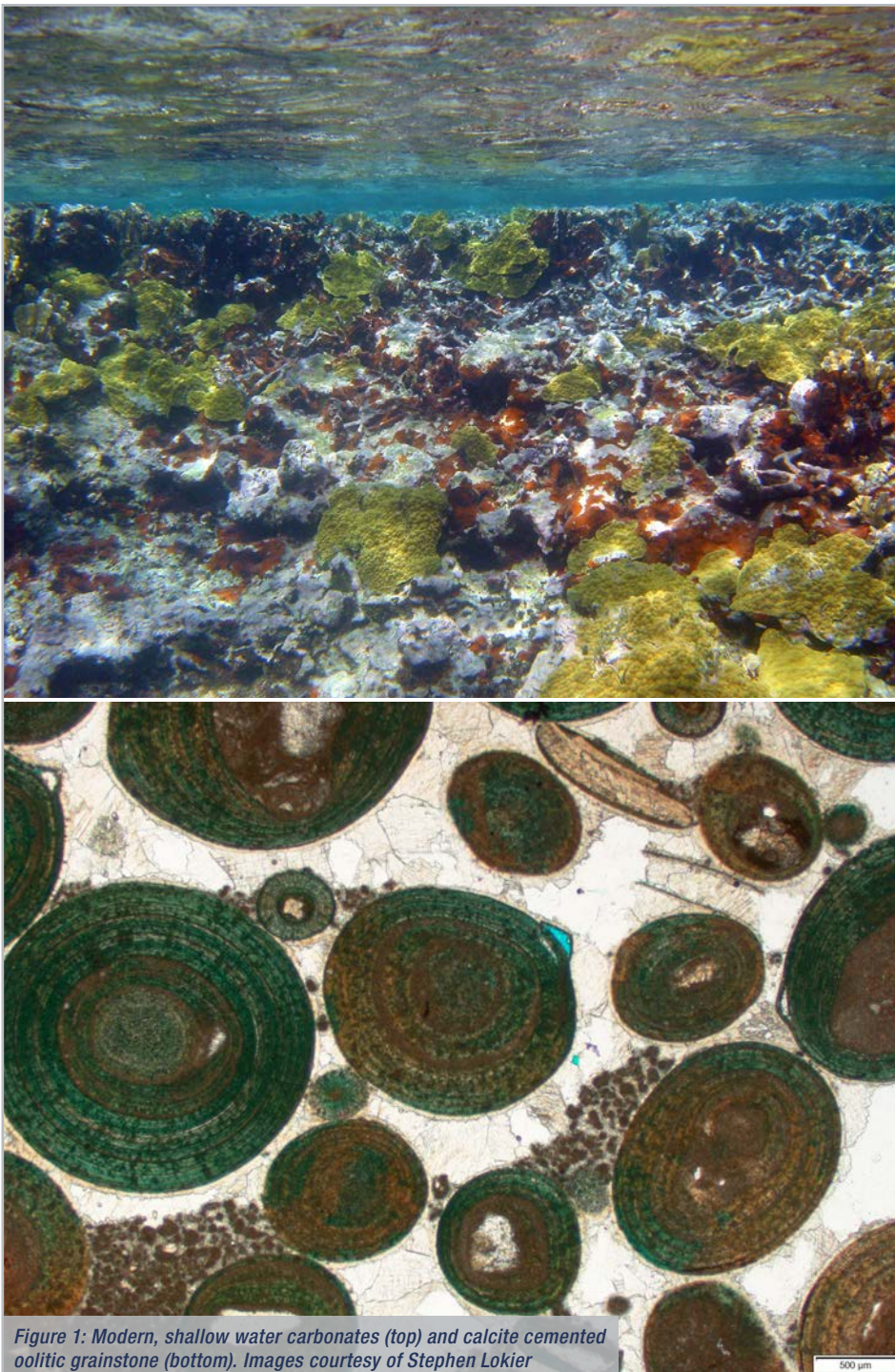


Figure 1: Modern, shallow water carbonates (top) and calcite cemented oolitic grainstone (bottom). Images courtesy of Stephen Lokier

talks would be short, with ample discussion time, and encouraged the presentation of fundamental science. We encouraged submission of work in progress and ideas that were not necessarily fully formed.

The response was excellent and we quickly filled all 32 oral presentation slots with submissions by early career scientists. In an important departure from normal conference practice, mentoring was provided to contributors, with each abstract reviewed by two members of the scientific committee. Feedback was given, and the lead author invited to resubmit a modified version for publication in the abstract volume.

When the UK entered 'lockdown' in late March, we had to quickly decide how to proceed. Although the schedule of conferences that had been postponed until 2021 was looking increasingly full, we also wanted to sustain the high level of enthusiasm for the meeting and provide some much needed 'time out' and social contact within the community. On this basis, we decided to keep the same 2020 time slot but move the meeting fully online - albeit with very little time left to prepare and no real idea of how such an event might work.

## The Carbonate Forum online

A solution to both conference registration and delivery was found through Seds Online (<https://sedsonline.com>) - a new

initiative founded by Stephen Lokier (Bangor University), Catherine Russell (University of Leicester) and Joanna Pzsonka (Mineral and Energy Economy Research Institute of the Polish Academy of Sciences). Established to provide an interactive, adaptable and accessible online platform for anyone with an interest in the field of sedimentology, Seds Online aims to support the community and make sedimentology meetings more accessible. It's free to join and open to all, thanks to sponsorship from the International Association of Sedimentologists - through their website, Zoom Pro® licence and experience in running webinars, we were quickly able to derive a protocol for online conference registration, attendance and delivery (Figure 3).

We advertised the meeting via Seds Online and social media, and interest ramped up so rapidly that we ended up curtailing initial registration at 700. We added two keynote speakers, Prof Martin Blunt (Imperial College London) and Dr Ashleigh Hood (University of Melbourne) and created space for discussion within 'breakout' rooms. Posters were uploaded online, and presenters were able to introduce their poster during one of the sessions to attract interested delegates into their poster-dedicated breakout space. Support for the transition to online

delivery was virtually unanimous, with only one speaker withdrawing their submission - the vacated slot was quickly filled.

We hoped that by adopting a format as similar as possible to that of a conventional, face-to-face meeting, we would create a familiar virtual meeting environment where participants felt comfortable, relaxed and focused on the science. Chaired themed sessions ran in 100 minute blocks with speakers given up to 12 minutes to present their research, followed by 8 minutes of discussion. If speakers overran, they were warned that their video (i.e. their presentation) would be turned off; happily, this proved redundant as all speakers ran perfectly to time. At the conclusion of each presentation, the chair invited audience questions to be submitted via the chat function in Zoom. The chair read out each question and the presenter responded.

## Registration and security

To circumvent concerns about security, only people who had registered and collected their 'meeting badge' (i.e. responded to an email to pick up their personalised meeting link) were 'admitted' to the conference. All attendees were asked to honour the meeting code of not screen capturing any of the presented material. However, ▶

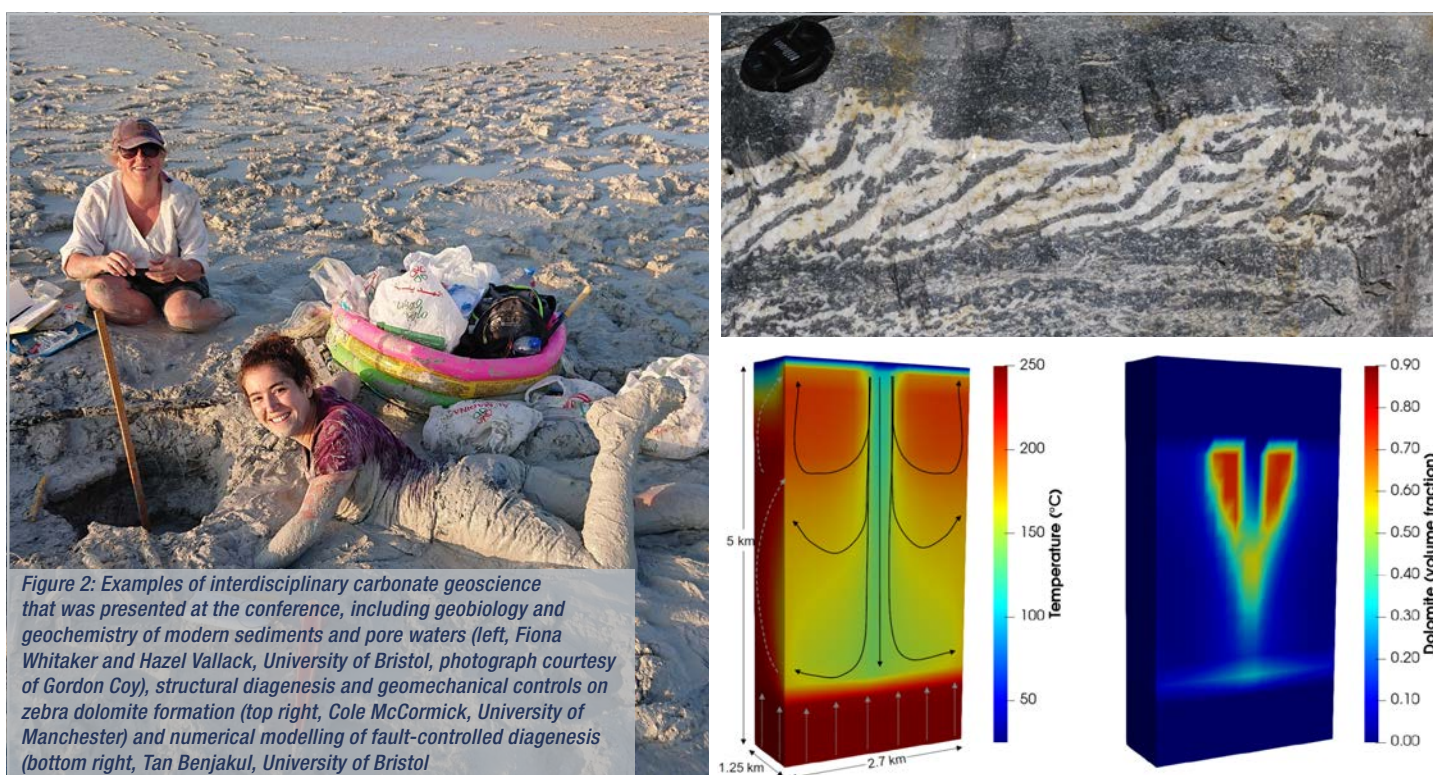


Figure 2: Examples of interdisciplinary carbonate geoscience that was presented at the conference, including geobiology and geochemistry of modern sediments and pore waters (left, Fiona Whitaker and Hazel Vallack, University of Bristol, photograph courtesy of Gordon Coy), structural diagenesis and geomechanical controls on zebra dolomite formation (top right, Cole McCormick, University of Manchester) and numerical modelling of fault-controlled diagenesis (bottom right, Tan Benjakul, University of Bristol)

► presenters were offered the opportunity to have their talks recorded and made openly available via the Seds Online website – an offer that was taken up by 80% of presenters.

To ensure sound and visual quality, all microphones and video feeds were turned off, apart from the speaker and session chair. All presenters were invited into a ‘Green Room’ prior to their session where they met the chair and did a quick microphone and video check to identify any problems prior to their presentation. In the rare cases where presenters had insufficient bandwidth, we turned off their video, and they just shared their screen and audio.

There are many potential risks associated with running an online meeting, particularly with such a short timeframe in which to prepare.

Thankfully, all the things we anticipated might go wrong did not. There were no sound failures, and no significant interruptions or distractions from external noise, pets, children or Zoom-bombers. Maybe this was serendipitous, but the lack of hitches suggests that the freely available technology is very capable of running such events. From a security perspective, a few of the registrants did share their personalised meeting link, but these individuals were then denied entry to the meeting by a small volunteer tech team who monitored entry to the ‘waiting room’.

### A greener, inclusive conference

All of the presenters ‘showed up’ and gave very high quality and thought provoking presentations that spanned the spectrum of carbonate geoscience. Any concerns about the degree of participation and interaction rapidly dissolved. In fact, the range, abundance and quality of questions far surpassed those at many conferences, with insightful, probing questions from postgraduate students through to highly experienced academics. Speakers were engaged, detailed and enthusiastic in their answers and often the hardest duty for session chairs was to keep the discussion within time. This suggests that the discomfort many people feel standing up and asking a question at a conference dissolves in a remote setting.

The original Carbonate Forum aimed for



Figure 3: Participants in the last session of the Carbonate Forum

a maximum, and optimistic, 80 attendees, with most delegates expected to be from UK universities. In the end there were 466 participants over the two days, representing 56 countries, comprising early career researchers (62% of delegates), academics and industrial practitioners (Figure 4). Not surprisingly, the largest number of participants was from the UK (21%), but the numbers after that were surprising, with a significant contingent from North America (13%), Brazil (9%), Italy (5%) and Pakistan (5%). Many were participating in the conference late at night or very early in the morning. For those that could not watch all of the talks ‘live’, recordings provided the opportunity to catch up later.

As discussed above, attendance at international meetings can be challenging for a wide variety of financial, environmental, political or time-constraint reasons. However, it is a fair assumption that all of those who participated in the Carbonate Forum had a significant interest in the topics and, in an ideal world, would have wished to attend the physical meeting as originally envisioned.

Recognising this, we undertook a quick analysis of the hypothetical environmental impact of all of our international delegates flying to the UK to attend the meeting in person. Assuming travel from their nearest major airport, they would have flown a total of 4,298,500 km - a distance equivalent to 5.5 return trips to the moon (or 15.3 billion standard geological hammer

lengths!) These flights would have generated a staggering 722 tonnes of CO<sub>2</sub>, compared to 7.1 kg of CO<sub>2</sub> calculated for their participation via Zoom.

Of course, in its original format, fewer people would have attended the meeting in person but both improved accessibility and reduced environmental impact can be significant benefits of virtual scientific engagement.

### Widening access

Analysis of the demographics of the conference delegates also raises important issues around inclusivity. In the west, we often take for granted the ease with which we can fly to international conferences. We typically live relatively close to airports that are international hubs and operate budget airlines to many cities. Most of us are also citizens of countries without requirements or long wait times for visas.

Many of the world’s scientists do not enjoy these logistical and economic luxuries. Increasing global access to low cost, high-speed internet connectivity offers the potential to reduce these disparities, placing scientists on a more level playing field regardless of geographical location or economic constraints.

Online, remote access conferences widens access for those with caring responsibilities - in particular women and single parents - as well as those with health and mobility problems. Many of us use the conference circuitry to remain in touch with a core group of researchers; indeed,

conferences provide fantastic opportunities to meet up with old friends and colleagues. But we should be asking ourselves what this tells us about our community. If we are unintentionally excluding a significant part of the global scientific community, are we really opening ourselves up to new ideas, data and thought processes, or are we in danger of becoming insular and myopic? If you are not from Europe, North America or Australasia, how can you truly participate and your important contribution be heard?

Finally, we were delighted to see significant engagement from carbonate specialists in industry (24% of delegates), many of whom were from the energy sector. With the low oil price of the last few years, there have been significant cuts in training budgets, inhibiting continuing professional development, and reducing knowledge exchange between the academic community and end-users of their research. Perhaps online forums can reopen the lines of communication – something that will be very important as we equip our nations for low carbon, sustainable futures.

All this suggests that the time is now opportune to rethink our attitudes towards,

and the true benefits of, attending international conferences. Playing devil’s advocate, we may ask: in an age of inexpensive and easily accessible global communications, do the scientific benefits of travelling to international meetings really justify their financial and environmental cost, particularly when many of those we engage with are researchers from our country of origin?’

### Is online the future?

This article has focused on the positive benefits of online conferences, and the relative ease with which they can be set up, even by those of us with relatively little experience in this area. However, this does not mean that we think traditional conferences should be consigned to the past – there are still many advantages in meeting face-to-face.

The hardest thing to manage online was a fluid and seamless flow between breakout rooms – people could only select one at a time, and once in a room the discussion had to be as a single group. There is no easy mechanism in a virtual world to just drift past a poster – or person

– and find something you are interested in. It is less social and spontaneous. Setting up large meetings with parallel sessions will be more challenging, but perhaps new formats can be developed where meetings are run for longer time periods by more people, or hybrid meetings can be developed where material is streamed online and questions are asked via a chat function that operates inside the conference room as well as for remote attendees.

What is clear is that there is now the potential for low cost, low carbon, inclusive, and scientifically invigorating discussions that will perhaps move us towards more effective and productive participation from all sectors of our community across the globe. For us, the success of the meeting has convinced us that there is the energy and momentum to bring the carbonate community together, online again, in 2021 for the 2nd Carbonate Forum.

Cathy Hollis (University of Manchester), Stephen Lokier (Bangor University), Peter Burgess (University of Liverpool), Stefan Schroeder (University of Manchester), Fiona Whitaker (University of Bristol) and Rachel Wood (University of Edinburgh).

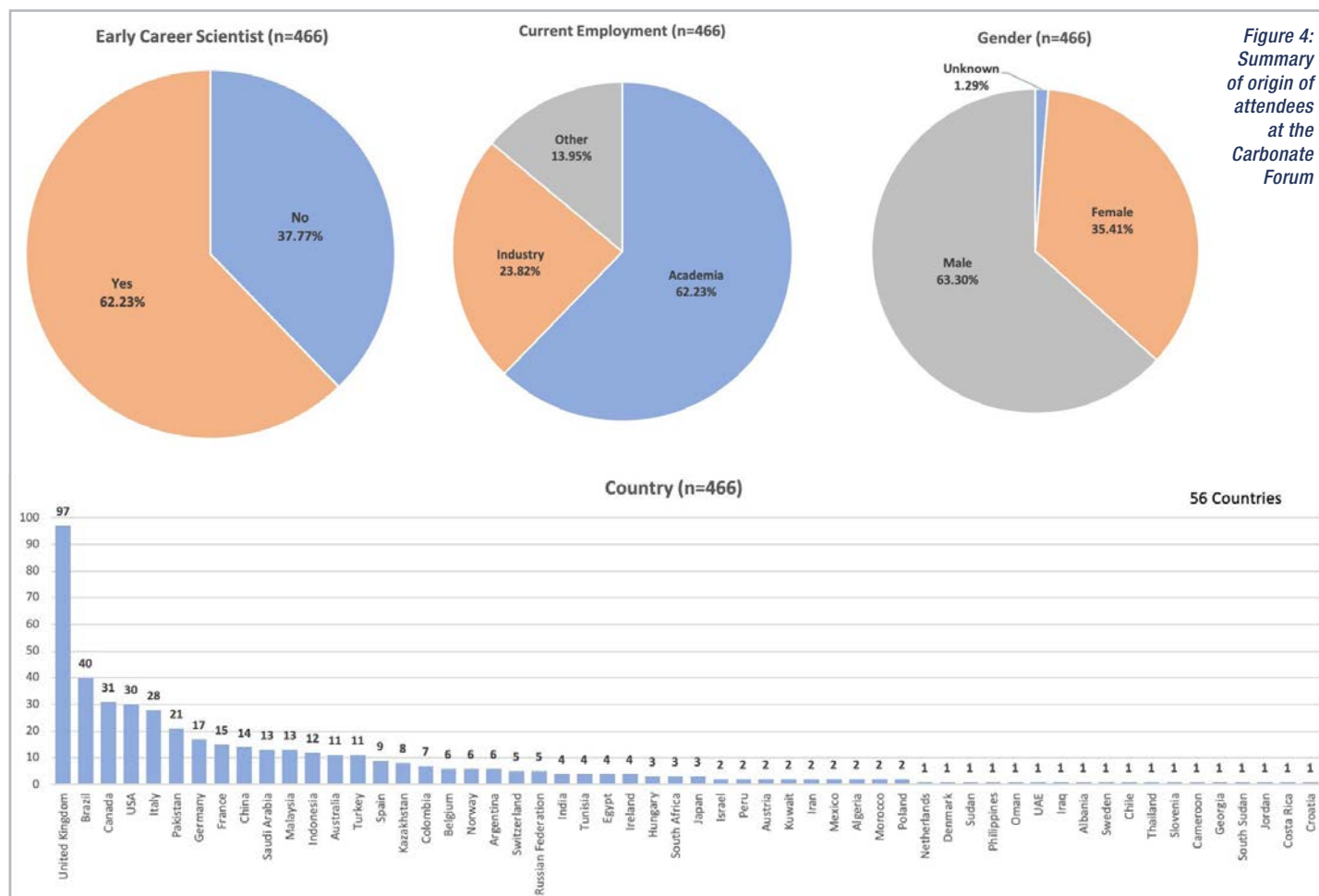


Figure 4: Summary of origin of attendees at the Carbonate Forum

# SECURING OUR FUTURE

Mike Daly, The Society's new President, reflects on history and sets out some questions as the Society looks to the future...





**T**he Earth sciences have never been more relevant or more integrated with other science disciplines than they are today. Much of the most exciting and relevant research and industrial work that Earth scientists do comes under large, integrated themes: securing the new resources required for the energy transition; monitoring and protecting people from geohazards; mitigating the impacts of environmental change and managing the storage of radioactive and carbon waste; and the comparative tectonics of Earth and planetary evolution.

These themes and others are rooted in Earth science, yet reach beyond the traditional disciplines of geology and raise several questions that the Geological Society needs to consider for its future. For instance, how should we contribute to the changing themes of Earth sciences? How can we support the Society's Specialist Groups to both develop our core disciplines, and help them visibly contribute into those bigger themes? How can the Society (and our science) reflect the diversity of the community we serve, and how might we achieve a more agile and externally facing mindset?

## A look back

"..... the story of the development of the surface of the earth should interest everyone...for the simple reason that we walk about on that surface, grow our food in it, get the raw materials of industry from under it and, in these days of so-called progress, dig a nice safe shelter deep below it." So wrote H. H. Read in his 1944 review of Arthur Holmes' book *The Principles of Physical Geology*.

As President-designate learning about the Society's history I couldn't help reflect how much and how little has changed since Read's entertaining book review. I thought I'd share some of the perspectives I've gained, and pose some questions I have about the future – a future where a past dominated by the exploration and exploitation of our planet is being replaced by a focus on its stewardship and sustainability.

## 1807-2020

Formed in 1807, the Geological Society's history may be considered in four parts (Chart 1). During the first half of the nineteenth century, geology was characterised by the move to synthesise observation and specimen collection in terms of principles and process. Members of global reputation such as Lyell, Darwin, Murchison and Sedgwick were the Society's leaders, and their output laid much of the foundation of geology as we recognise it today. Not least, in 1849, the realisation of the impact of ice on Britain's landscape, and the profound environmental change that implied.

Those heady days were followed by a more UK-focused outlook, epitomised by Geikie and Lapworth and the mapping of Peach and Horne. Through the turn of the century they laid the basis for much of our understanding of the geology of the British Isles and stratigraphy globally.

## Plate tectonics, age dating and a new UK industry

In contrast, during the first half of the twentieth century, against a backdrop of two world wars and the Great Depression, the Society struggled to make a mark. In 1914 the UK Government bought a controlling stake in the Anglo Persian Oil Company. The Society, having played a big role in the exploitation of coal resources, didn't contribute significantly in those early days of the oil industry. We also missed the radiometric dating of rocks and the quest for an absolute timescale. Arthur Holmes, a pioneer of both, published 31 papers between 1911-1962, none in the Society's journal. Similarly, the Society was relatively silent on the growing evidence and debate around continental drift.

After World War II things changed again and the latter part of the Society's history began. Holmes was awarded the Wollaston medal and in 1964 a meeting in his honour delivered the seminal book *The Phanerozoic Time Scale*. In 1963 a lecture by Teddy Bullard awakened the Society to the new geophysical evidence for continental drift. In 1967 Dan ►

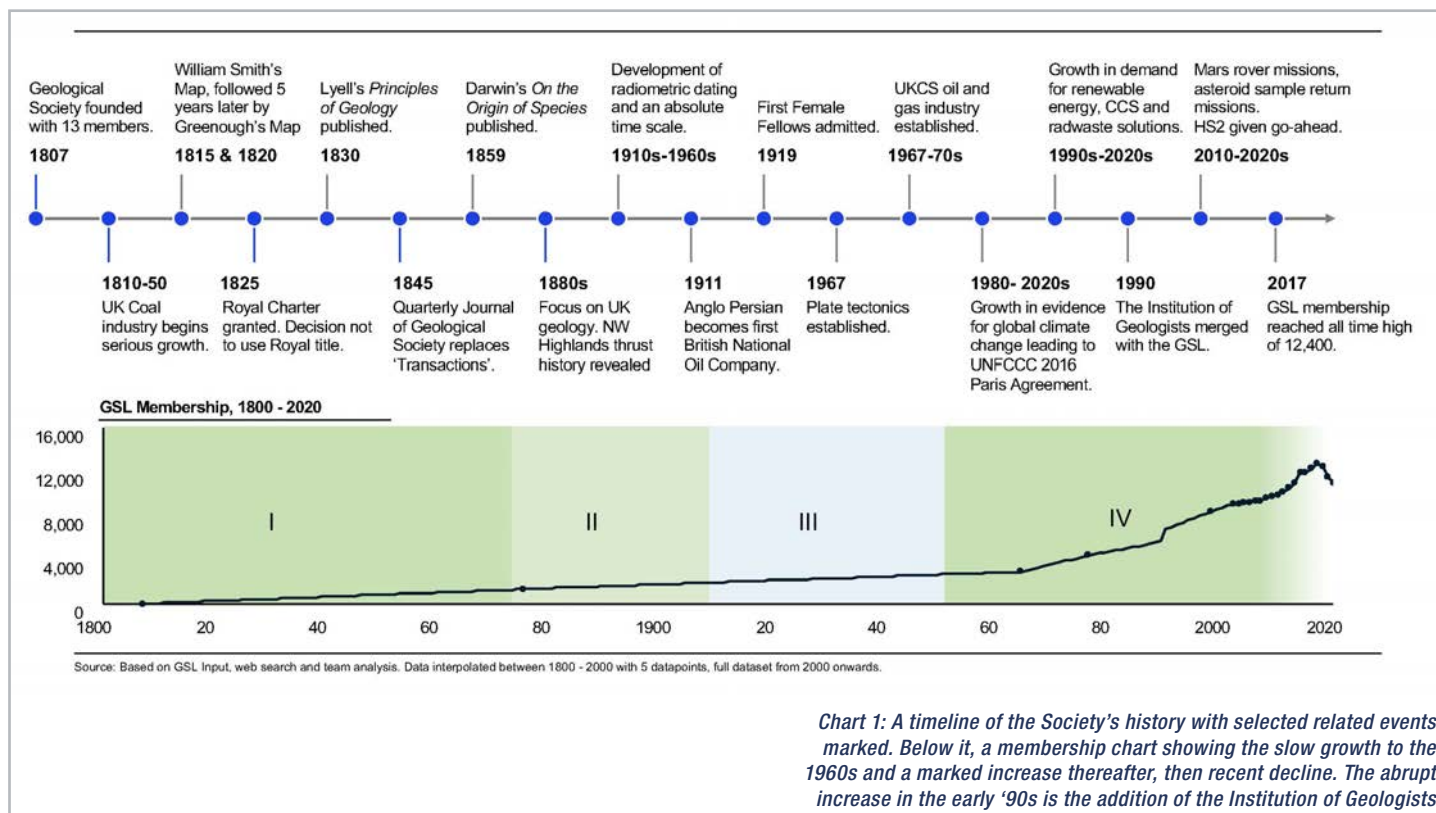


Chart 1: A timeline of the Society's history with selected related events marked. Below it, a membership chart showing the slow growth to the 1960s and a marked increase thereafter, then recent decline. The abrupt increase in the early '90s is the addition of the Institution of Geologists

► McKenzie led the breakthrough to Plate Tectonics and John Dewey brought that tectonic context to British and global geology. In 1967 the first North Sea gas landed at Easington in Yorkshire. Oil followed into Scotland in 1975 and a new UK industry, grounded in geoscience, was born.

The three new directions - plate tectonics, absolute age dating and North Sea oil & gas - brought new relevance and funding to our science and the Society. These days were among our most productive, with activity straddling both academia and industry. The Institution of Geologists merged with the Society in 1990. The growth in Chartered Geologists highlighted the importance of Earth science and the engineering and environmental challenges geologists were engaged in, along with the required professionalism. The Society's membership grew, peaking in 2017 at 12,406.

## Global change

A wind of change was felt in the 1990s as concerns were raised about the impact of greenhouse gases in the atmosphere. Widespread evidence of the effects of global warming on ice sheets, oceans and deserts, together with the declining air quality of large

cities, popularised this concern.

That concern has led to global activism calling for reduced anthropogenic carbon emissions, and to large parts of the petroleum industry competing to decarbonise. This latter challenge is exacerbated by the Covid-19 pandemic that, for now, has destroyed ~25% of the global demand for oil with a consequent collapse in price and jobs.

At the same time, geoscience research funding has moved towards thematic issues of science with a clear relevance to society; a trend heralded by the earlier rebranding of university geology departments as Earth Sciences or Earth & Environmental Sciences.

## 2020

At the end of 2019 the Society had 11,932 members, spread throughout the UK and overseas (Chart 2). We continue to appeal to a broad range of geoscientists, many of whom are Chartered. We organise high quality, internationally streamed conferences (such as "Plate Tectonics at 50" in 2017) and support a range of Specialist Groups that sustain the fundamentals of our science along with many active Regional Groups. The Publishing House produces an array of journals and books. Publication metrics are improving and the Society is making

strides towards Open Access publishing. Our outreach and educational activities have a vibrancy and impact well appreciated by teachers, schools and the wider public.

## The future

Despite the many positives, the rapidly changing global context has raised questions about the relevance of the Society's membership offering to the 21st century geoscientist. This seems particularly an issue for some academics and early career geoscientists who do not always see their integrated, thematic science reflected in our activities. The Society's attractiveness to a generation of flexible social media users is also being questioned. But most concerning is the difficulty geosciences as a whole, and the Society in particular, has in reflecting the diversity of the UK community.

To begin to address these issues, in early 2020 Council launched a "Strategic Options Review" to consider our future direction and specifically the relevance of our science and membership programmes. We have been fortunate to enlist an international management consultancy firm to help us with this significant task (on a *pro-bono* basis). They bring an

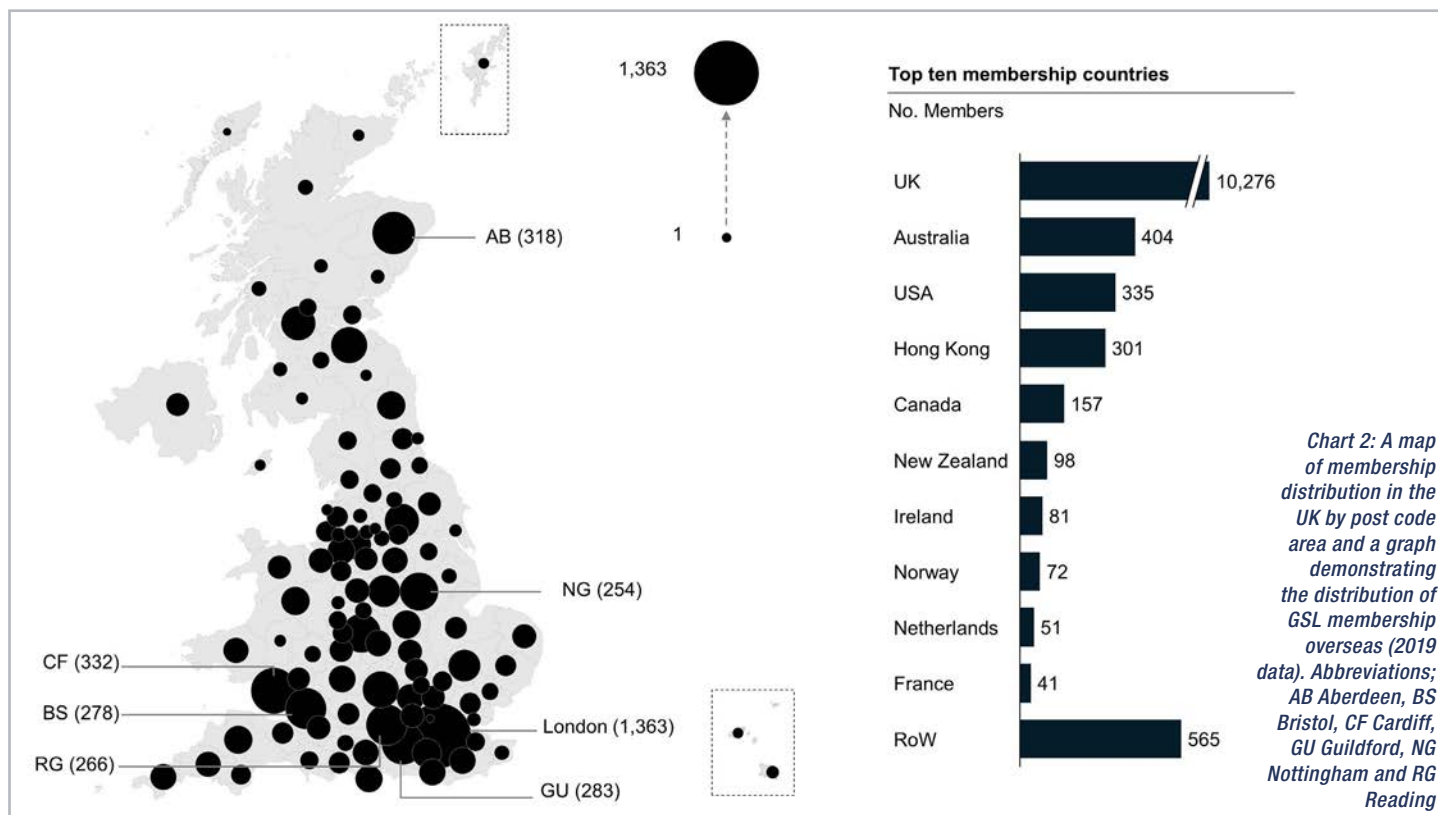


Chart 2: A map of membership distribution in the UK by post code area and a graph demonstrating the distribution of GSL membership overseas (2019 data). Abbreviations; AB Aberdeen, BS Bristol, CF Cardiff, GU Guildford, NG Nottingham and RG Reading

experienced and independent voice to challenge and inform us. Any final proposals and outcomes from the project will be discussed with Council in September and communicated to membership thereafter.

This time of change and uncertainty is an interesting period for our science and for the Society. The transition from ‘exploration and exploitation’ to ‘stewardship and sustainability’ raises many questions, not least of all how the Society will respond. How we deal with these questions, and participate in this changing world, will determine our ability to be relevant and thrive through the coming decades.

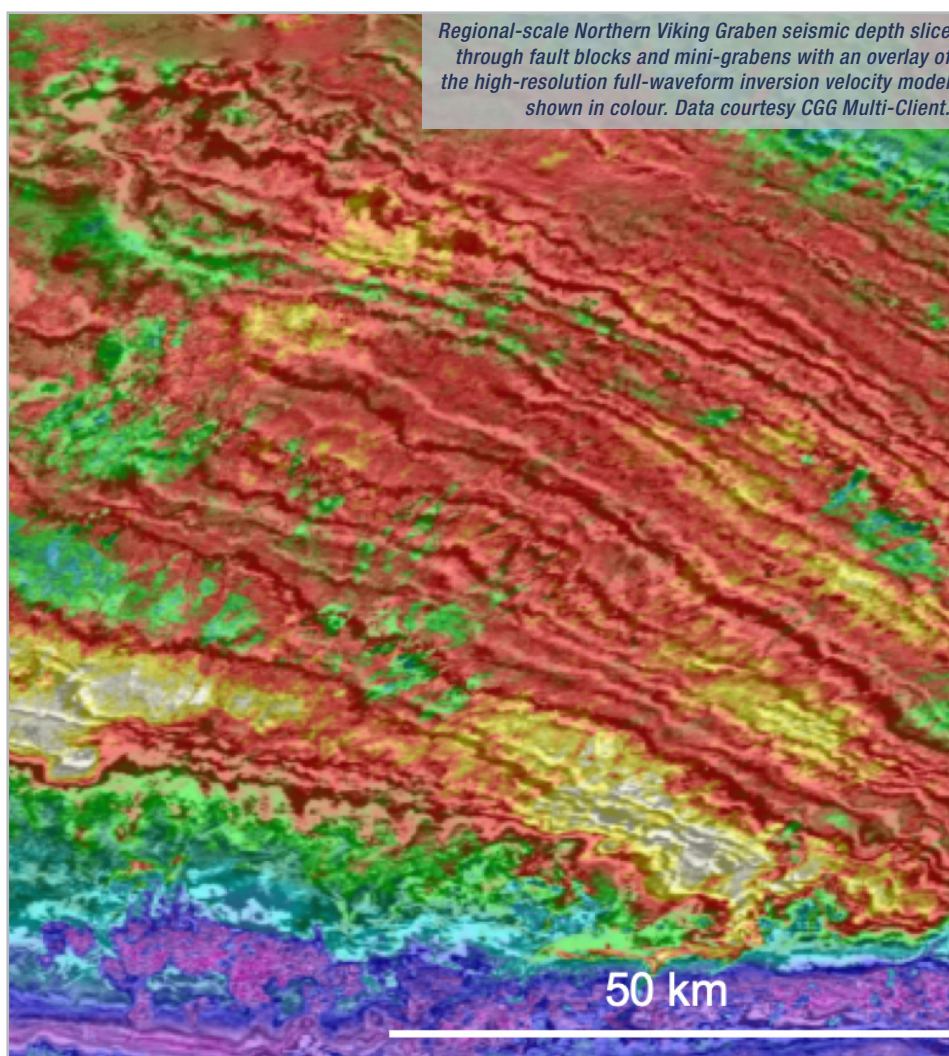
**Mike Daly is President of the Geological Society. With a background in industry and academia, he is currently a Visiting Professor at Oxford University researching continental tectonics and resource systems, and holds director positions at Tullow Oil and CGG Geoscience**

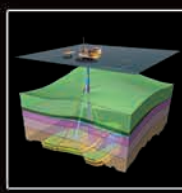
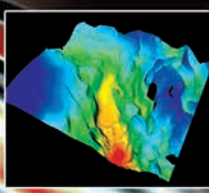
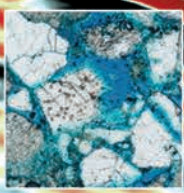
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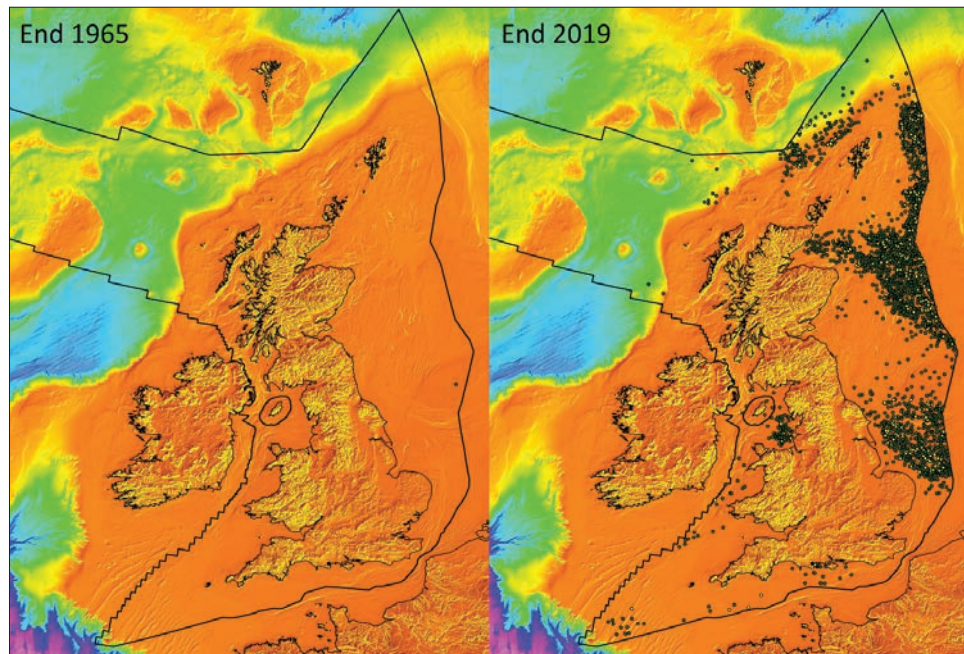
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This conference marks the publication of Memoir 52 in Q3 2020. Sixteen invited speakers will discuss fields which are contained in the Memoir. These talks will cover all of the major UK basins and will highlight themes which run through the Memoir. These themes include the utility of seismic data across the value chain, evolution in drilling and completion technologies, recent and near term field developments, and new exploration targets in less common reservoirs and subtle traps. As such it will be of benefit to all geoscientists working the UKCS.

**For further information or to register please contact:**

Sarah Woodcock, sarah.woodcock@geolsoc.org.uk

Web: <https://www.geolsoc.org.uk/11-rescheduled-memoir-52-launch-conference-2020>

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Due to the ongoing situation with Covid-19 and acting on advice from the UK Government, the Society's offices in London and Bath are closed at time of writing. Unfortunately, this is impacting some of our upcoming events – we are rescheduling and adapting to virtual events where possible.

Please visit [www.geolsoc.org.uk/events](http://www.geolsoc.org.uk/events) for the latest updates. If you have any questions about upcoming events, please contact [conference@geolsoc.org.uk](mailto:conference@geolsoc.org.uk).

## VIRTUAL EVENTS

MEETING	DATE	VENUE AND DETAILS
GSL Public Lecture: Getting inside the heads of early vertebrates	2 September	Lecture <b>Venue:</b> Taking place remotely <b>W:</b> <a href="https://www.geolsoc.org.uk/earlyvertebrates">https://www.geolsoc.org.uk/earlyvertebrates</a>
West Midlands Regional Group: September meeting, 'Cold supraglacial volcanic deposits and their effects on glacial ablation'	8 September	Lecture <b>Venue:</b> Taking place remotely <b>W:</b> <a href="https://www.geolsoc.org.uk/09-wmrg-sep-meeting-2020">https://www.geolsoc.org.uk/09-wmrg-sep-meeting-2020</a>
Geopoetry 2020	1 October	Workshop, Geology walk <b>Venue:</b> Taking place remotely <b>W:</b> <a href="https://www.geolsoc.org.uk/geopoetry2020">https://www.geolsoc.org.uk/geopoetry2020</a>
Mineral resources estimation: recent advances and current best practice	19 October	Conference <b>Venue:</b> Taking place remotely <b>W:</b> <a href="http://www.geolsoc.org.uk/10-gsl-mineral-resource-estimation-2020">www.geolsoc.org.uk/10-gsl-mineral-resource-estimation-2020</a>

## RESCHEDULED EVENTS

MEETING	NEW DATE	VENUE AND DETAILS
Marine Reptile Conference 2020	29 Sept – 1 Oct	Conference <b>Venue:</b> The Etches Collection, Kimmeridge, Dorset <b>W:</b> <a href="http://www.geolsoc.org.uk/09-rescheduled-marine-reptile-conference-2020">www.geolsoc.org.uk/09-rescheduled-marine-reptile-conference-2020</a>
Plastics in the Environment	15 March 2021	Conference <b>Venue:</b> Burlington House, London <b>W:</b> <a href="http://www.geolsoc.org.uk/plastics2021">www.geolsoc.org.uk/plastics2021</a>
Core Values: the role of core in 21st century reservoir characterisation	5-7 May 2021	Conference <b>Venue:</b> Burlington House, London <b>W:</b> <a href="http://www.geolsoc.org.uk/05-rescheduled-pg-core-values-2021">www.geolsoc.org.uk/05-rescheduled-pg-core-values-2021</a>

## STICKS AND STONES

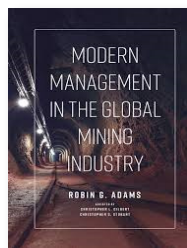


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# BOOK REVIEWS

## Modern Management in the Global Mining Industry



This book seeks to assist mining industry decision-makers with the practical aspects of mineral economics. The focus is on tackling some of the management myths that lead to poor economic decisions in the industry, the principal amongst these myths being “*that the only viable business strategy... is to build or acquire low cost operations...*”

The author draws upon 40 years of experience at the London-based independent mineral economics consultancy CRU Group. The book is a posthumous release, with Adams having passed away in 2014, devoting his last few months to writing this book. It was subsequently finalised by his wife, Judith, and long-time colleagues Christopher Gilbert and Christopher Stobart.

Though technical, this is not a ‘textbook’ *per se*. The book does not teach you the theory of mineral economics, nor take you through example calculations. Instead, it aims to help you think more critically about mineral economics and thus make smarter business decisions when using such data and sources.

To emphasise the industry focus it is worth summarising the contents, which include price forecasting and risk management, commodities marketing and exchanges, shareholder value, mining costs, performance improvement, capital productivity, risk and cost, industry cyclicality, and resource depletion, recycling and the environment. Subjects such as commodities marketing and the role of commodities exchanges are less frequently discussed in the broader realm of mineral economics yet are vital to mining industry decision-making and strategy. Another area of particular value is the discussion of operating costs and capital productivity in mining – an area where the author was a world-leader. All mining industry managers should make themselves familiar with the value-based costing approach described in the book.

Despite its industry focus, the text has a thoroughly modern take on the minerals industry, accepting it is an industry of broad

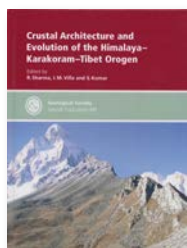
controversy. In this spirit, Adams states that the modern mining manager needs to be a ‘Renaissance’ figure conversant in geology, metallurgy, engineering, economics, finance, sociology, anthropology, politics, communication and so on. Whilst the focus of the book is economics, there are excellent and well-balanced discussions of mining, the environment and society. Indeed, his final chapter on ‘Unfinished Business’ includes some quite radical proposals for future mining industry practice.

All in all, Adams’ book would be a valuable addition to the personal libraries of all minerals professionals, the corporate libraries of minerals companies, and the libraries of universities charged with teaching future leaders in the sector – mining and exploration geologists included.

Reviewed by **John Sykes**

**MODERN MANAGEMENT IN THE GLOBAL MINING INDUSTRY** by ROBIN G. ADAMS assisted by CHRISTOPHER L. GILBERT & CHRISTOPHER G. STOBART, 2019. Published by: Emerald Publishing 292pp (hbk) ISBN: 9781789737882  
List Price: us\$48.00. W: <https://books.emeraldinsight.com>

## Crustal Architecture and Evolution of the Himalaya-Karakorum-Tibet Orogen



Geological expeditions in the Himalaya-Karakorum-Tibet (HKT) region began in the 1850s. Since then, geoscientists around the world have been determined to study and achieve a better understanding of the evolution and architecture of this youngest orogen on Earth. These studies have yielded many books and edited volumes with new and updated information every time.

This new volume continues that trend, presenting new insights on the crustal architecture and evolution of the HKT Orogen.

Apart from the editor’s introduction, the volume presents 17 research articles using various techniques of geological, geochemical and geophysical processes.

A preferred approach is to address a region for its geological evolution and crustal architecture through its geological age. Given this, the chapters progress from present tectonic activities (e.g. the present crustal motion and a review on historical seismic events) to the evolution and crustal architecture of the orogen, which dates back to the post, during and pre collisional events.

The volume summarises the latest discoveries and research into the HKT Orogen, such as (i) the discovery of the back thrusts related to inherited structures (Garhwal Lesser Himalaya) (ii) first report on the alkaline schorlitic tourmaline from the Tso Morari Crystalline Complex (Ladakh) (iii) a new report on the Lazulite in the vicinity of Main Central Thrust (Kumaun Himalaya) (iv) a possible new precursory approach for the future earthquakes from the GNSS data of Everest Pyramid Lab (v) new Geochronological ages and (vi) the role of inherited structures on the evolution of the orogen.

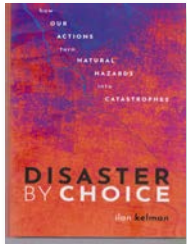
Through different chapters, the book comprehensively deals with the geodynamics and kinematics of various features; e.g., High Himalayan Discontinuity and Main Himalayan Thrust. Further, this volume discusses the role of fluids in the geodynamic, geochemical and tectonic evolution in this region viz., the presence of slab driven fluids, Oligocene partial melts (Nepal) and the presence of partial melts in the HKT region from geophysical techniques and low salinity C-O-H fluids as fluid inclusions.

Apart from a few errors in text and figures, the authors and editors have prepared the volume beautifully and efficiently. This volume addresses the recent advancements in the geology of the Himalaya and Karakorum; however, it lacks in describing the same for Tibet. On balance, I suggest this book to be a valuable addition to the libraries of scholars of the HKT regions and also to the whole geoscience fraternity to widen their understanding of the geology of an evolving mountain chain.

Reviewed by **R. Arun Prasath**

**CRUSTAL ARCHITECTURE AND EVOLUTION OF THE HIMALAYA-KARAKORAM-TIBET OROGEN** by Sharma, R., Villa, I. M., and Kumar, S. (eds) 2019. Published by The Geological Society, 386pp (hbk), Special Publication 481, ISBN: 978-1-78620-403-5  
List Price: £120.  
W: [www.geolsoc.org.uk/SP481](http://www.geolsoc.org.uk/SP481)

## Disaster by Choice: How Our Actions Turn Natural Hazards into Catastrophes



I am typing this review in the aftermath of property-damaging floods in the UK and life-taking wildfires in Australia, and during the Covid-19 pandemic.

Floods, fires and viruses are just three of a panoply of natural hazards that includes earthquakes, volcanic eruptions, tsunamis and many others. The thing that makes a natural hazard a disaster is when it impacts on human populations, taking assets or (worse yet) lives.

Disasters arise from a lack of preparedness, which may result from individual actions or a lack of political will. In this timely book, Ian provides numerous examples of both disasters and disaster aversion. Only a very few can be summarised here.

In a story that resonates with the moorland fires in England, three people in July 2016 chose to camp in the woodlands around Nederland, Colorado, and did not properly extinguish their barbecue. One day later a wildfire lit up the forest in the Cold Springs Fire, which killed numerous animals, forced 2000 people to evacuate, and destroyed eight homes. The trio were arrested and tried. Their sentence allows them to work during the day, returning to prison at night. It will take them the remainder of their lives to pay for the damages awarded against them. However, eight houses within the burnt area were participating in the Wildfire Partners programme of mitigation measures. These survived.

While affluent people may face damage due to the appeal of living at unsuitable sites, such as in woodland or on beachfronts, economically disadvantaged people may find themselves moving to unsuitable sites, such as floodplains or the flanks of volcanoes, out of economic necessity. Some disabled people might face something as simple as the lack of a ramp leading to a tornado shelter.

The main message of this book is that disasters are not natural. Societies and humanity choose to create them. We can

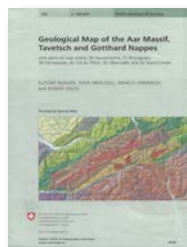
also, with insight, economic resources and political will, choose to prevent them. The tornado, tsunamic or earthquake are not to blame. Disasters arise when we fail to build suitable housing capable of withstanding 400 kph winds, fail to shun places subject to lava flows or tsunamis, or do not create a culture of warning and safe shelter for all – including for those with disabilities. Disasters for all, whether affluent or poor, able or disabled, are caused by vulnerabilities, not hazards. I hope that this book is widely read and its message heeded.

Reviewed by **Brent Wilson**

### **DISASTER BY CHOICE: HOW OUR ACTIONS TURN NATURAL HAZARDS INTO CATASTROPHES**

by Ian Kelman, 2020. Published by Oxford University Press. 167 pp, ISBN 978-0-19-884134-0, list price £16.99 List price **£16.99**. W: [global.oup.com](http://global.oup.com)

## Geological Map of the Aar Massif, Tavetsch and Gotthard Nappes



This 1:100,000 map presents a clear overview of the bedrock forming the Swiss central Alps, from the Doldenhorn, Eiger, Titlis and Tödi mountains along its northwest flank, to

beyond the upper Rhône and the main headwaters of the upper Rhine in the southeast.

Along strike from SW to NE, where it swings round more towards the east, the map spans 110 km, covering a swath of rugged terrain 30 to 40 km wide and clearly showing the principal groupings subdivided into over 100 colour coordinated units. These are identified by letter codes which could be larger within stippled units, and lower-case letters often obscured by the intricate cartography of the excellent base map, even if the keys are easy to read.

The bedrock is subdivided along strike by a number of very distinct Nappes, Variscan thrusts, faults and thrusts, plotted under the main glaciers and Quaternary fill which is only shown in the main valleys. In addition, four beautifully drawn true scale cross sections are shown separately on another piece of paper, cutting across the entire mountain

range to just below sea level. Ideally these would include the sense of displacement along the major faults which they depict. Two of them include the Lötschberg and Gotthard Base tunnels – 2,450 m below the surface beneath Piz Vatgire.

The accompanying booklet outlines the geology of the crystalline basement and other units in brief detail to form the majority of the text, before an informative and reasonably long account of the area's tectonic and metamorphic evolution. Where possible, the results of this work harmonise historic lithostratigraphic and tectonic units, so they are tabulated alongside their new equivalents into a more coherent synthesis based on international principles. This forms a key part of the Swiss geological data model which will become the basis for future surveys, to be published as new sheets in the 1:25,000 Geological Atlas of Switzerland series.

Naturally the geological evolution of the Alps since Ordovician times is highly complex, so the text could have been enhanced by some paleogeographic reconstructions. However, there are plenty of high quality photographs, often clearly annotated, plus many neatly drawn colour diagrams throughout the text. In particular, the map showing the facies concept with an insert diagram showing their temperature and pressure distribution is very clear, along with a P-T evolution graph for selected localities.

Given its size, the map would have benefited from back folding to make it easier to handle, rather than four panels dropping down 86 cm with a 126 cm width. Also, even if its depth had been increased to 100 cm (used for the 1:625,000 Bedrock Geology maps of the UK), it would not have been possible to fit easily beneath the map the series of cross sections shown separately on another piece of paper.

Finally, a brief section outlines some open questions which have yet to be resolved: the Vättis Window; the junction between the Aar Massif, Tavetsch Nappe, Glarus Nappe Complex and Ilanz zone which could fit one of three interpretations; and subdivision of the Aar Massif.

Reviewed by **David Nowell**

### **GEOLOGICAL MAP OF THE AAR MASSIF, TAVETSCH AND GOTTHARD NAPPES**

by BERGER, A., MERCOLLI, I., HEFWEIGH, M. and GNOS, E. 2017. Geological Special Map 129 with explanatory notes, 1:100,000. Federal Office of Topography, swisstopo, CH-3084 Wabern, Bern. 126pp (pbk) ISBN 978 3 302 40093 8 List Price 20 CHF [https://shop.swisstopo.admin.ch/en/products/maps/geology/special/GSK\\_PAPER](https://shop.swisstopo.admin.ch/en/products/maps/geology/special/GSK_PAPER)

## MORE CORE

Dear Editor, I enjoyed reading 'Core Surprise: What's Inside a Plate Boundary?' by Lucy McKay and co-authors in the July 2020 number of *Geoscientist*. In particular, it was interesting to read how a detailed examination of the clay layers sheds light on the mechanisms and internal structure of the Highland Boundary Fault. At the end of their paper the authors ask for suggestions for further work, and I would like to make two.

Firstly, that they should make an X-ray powder diffraction examination of the various clays found in the core of the fault.

Identification of the clay mineralogy in this way should shed light on the origin and nature of the clays, and allow a comparison to be made with other UK clays. Secondly, measurement of the shear strength and plasticity of the clays should allow the concepts of soil mechanics to be applied to the study of the mechanisms of the fault. These methods are described by Reeves et al, 2006.

**GRAHAM WEST (FGS)**

**Reference:** Reeves et al, 2006. Clay Materials used in Construction, Geological Society Engineering Geology Special Publication No 21.



### CORE SURPRISE: WHAT'S INSIDE A PLATE BOUNDARY?

Digging to expose clay 'inside' the Highland Boundary Fault, Lucy McKay, Zoe Slighton and Rebecca Lunn discover a remarkable sequence of clay and microfossils within the core of an ancient plate boundary

## BAD SCIENCE

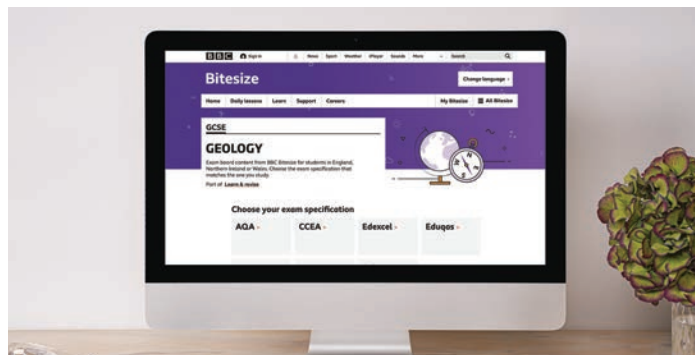
Dear Editor, Pete Loader rightly expects the BBC to be a reliable source of quality information, especially as distance learning is currently so important. It was disappointing to hear in his letter (*Geoscientist*, Vol 30, 5, May 2020) of flaws in BBC Bitesize's provision in their suggestion that the Earth's mantle is liquid. This commonly stated fact is wrong, and highlights an unscientific thought process: volcanoes erupt magma; magma comes from the mantle; magma is liquid; ergo the mantle is liquid!

Everyone should be taught that the mantle is known to be solid (albeit capable of flow like silly putty), because we can detect how earthquake waves pass through the planet's interior, and as 'S' waves pass through the mantle, even the quite young will understand that it is impossible to shear a liquid. I can still recall some rather wet students whom I challenged with the task of trying to grab hold of an uncontained column of water and shear/shake it from side to side!

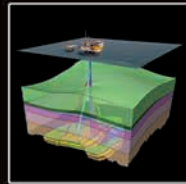
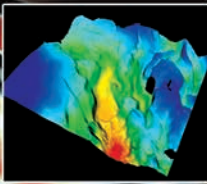
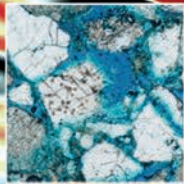
Way back in 1988 I warned that the the new National Curriculum would be a disaster if the geology it introduced were taught by non specialists without good support material. I have been banging on about bad geology and bad science ever since, and now numerous

errors in textbooks and on the net are joined by mistakes made by great institutions. I have been desperate to get my profession to take these problems seriously, and I now hope in these strange days of monumental change I might finally gain support.

**RICHARD ARTHUR (FGS)**







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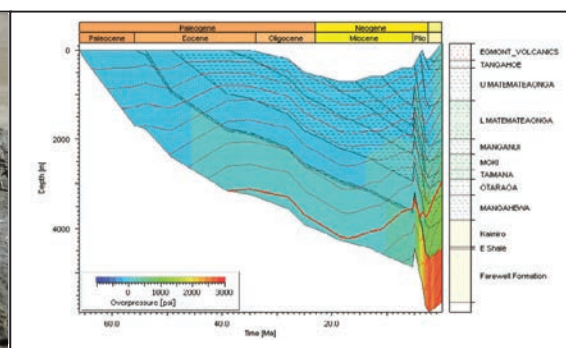
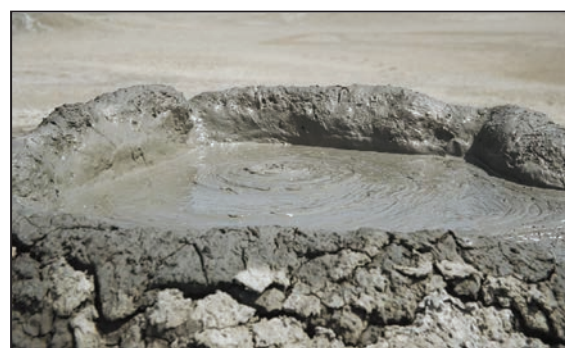
Confirmed New Date

# Geopressure 2021

## Managing Uncertainty in Geopressure by Integrating Geoscience and Engineering

### 22-26 March 2021

Virtual Conference



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

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

#### Additional Activities

**22 March 2021:** Best practice for PP and FG - Mastery Class - Led by Richard Swarbrick

**24 March 2021:** Virtual Field Trip - Led by Richard Swarbrick and Jack Lee to North Yorkshire Coast, GeoPressure in shales

#### Further Information:

For more information please contact [sarah.woodcock@geolsoc.org.uk](mailto:sarah.woodcock@geolsoc.org.uk) or visit the event website: <https://www.geolsoc.org.uk/03-rescheduled-pg-geopressure-2021>



Durham University

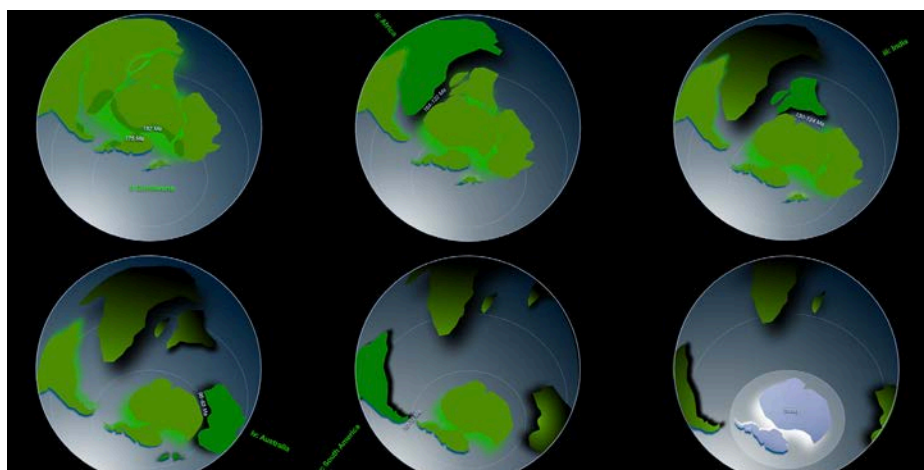
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## The song of the ice

*Earth scientist and musician Steve Garrett on a new project combining music, science, sound and animation to tell the story of the Antarctic ice sheet*



**Part 1: Gondwanaland breaks up, the continents move away, isolating Antarctica and the ice sheet forms**

**A**s a geologist, geophysicist and guitarist, I've always been interested in the links between music and science. My first job was with the British Antarctic Survey (BAS) in the early 1980s, and in recent months I've been working remotely with scientists at BAS to create a new work.

'The Song of the Ice' uses music, science, sound, animation and images to tell the story of the life of the Antarctic ice sheet in three parts, highlighting its long history, dynamic nature, beauty and role as witness to the changing state of our planet. We launched the work via a global live-streamed event to celebrate the 50th anniversary of Earth Day on 22 April 2020 on YouTube.

### Part 1 - isolate

The first section describes the last 180 million years (Ma) as other continents move away, isolating Antarctica and ending with the ice sheet forming.

I took a YouTube video 'Plate Tectonics Viewed from South Pole' by Chris Scotese and digitised the outlines of the continents with animation and shading effects to create a new movie playing forward in geological time with 1 second representing about 0.6 Ma.

A different musical theme represents each continent as it breaks away — first Africa, then India, then Australia, then South America, with the circumpolar current and ice sheet forming. Africa and South America share a common theme as they were once connected, whilst India moves quickly, as does the continent itself. Australia has a didgeridoo-like drone creating a dreamlike effect.

### Part 2 - grow

This section represents the last 30 Ma — the ice sheet grows and moves, accompanied by the sounds of ice-quakes and images of the ice sheet.

Key partners in this section included Dr Andy Smith and Dr Sofia-Katerina Kufner at BAS who provided geophysical data, Stuart Hamilton at Castlesound Studios who converted these data to meaningful sound, and geologist Chris Bell who processed digitally some of the analogue slides from my Antarctic fieldwork.

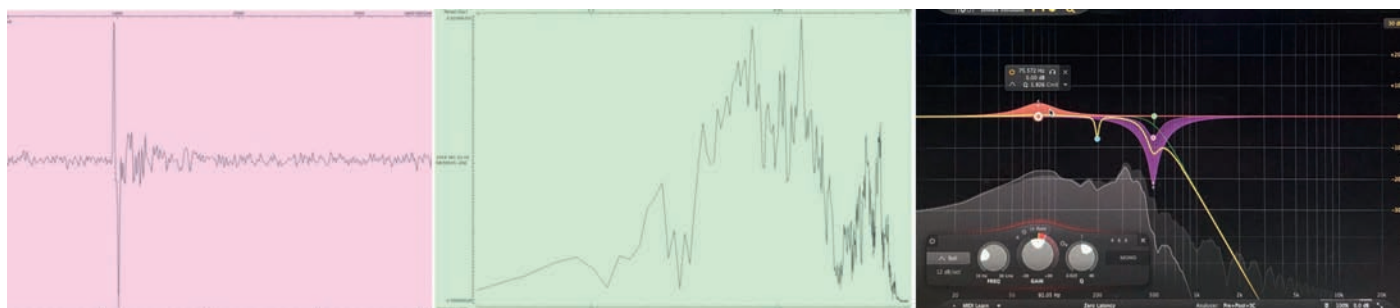
During three summer field seasons (1981-1984) I was fortunate to cover a lot of ground across West Antarctica and the Antarctic Peninsula as part of my job carrying out airborne geophysical (magnetic, ice radar, gravity) surveys - we also photographed some penguin colonies from the air. This gave me a wide variety of landscape images to reflect the beauty of the ice.

The geophysical data we used for this section were 'microseismic' data - 'ice-quakes' - from a fast-flowing major glacier draining the Antarctic plateau. We converted the data into sound files which were processed in the recording studio (dynamic noise reduction, amplitude balancing, filtering and reverb). Large events occur every 60-100 seconds, so to give more frequent events for the listener, 10 minute segments were superimposed.

### Part 3 - breathe

This section represents the last 0.8 million years — the rise and fall of CO<sub>2</sub> in ice cores converted to sound and music.

The key partner in this section was Dr Robert Mulvaney at BAS, who provided data from the European Project for Ice Coring in Antarctica (EPICA) Dome 'C' ice core data. These data show CO<sub>2</sub> concentrations in parts per million (ppm) from ice core data to 0.8 Ma



**Part 2: Microseismic data from a major glacier— amplitude, frequency and processing in the recording studio**



## DISTANT THUNDER

## *An easy mistake to make*

**Geologist and science writer Nina Morgan sympathises with some geological misunderstandings**

As a PhD student at University College London (UCL) studying microvertebrate fossils in the 1970s, palaeontologist Chris Duffin [b. 1951], now a Scientific Associate at the Natural History Museum in London, noticed something interesting. Examining acid-treated residues of microfossils from the Carboniferous Limestone from Wirksworth in Derbyshire, he came across what appeared to be articulated ostracod valves with a distinctive external sculpture. Unfamiliar with ostracod identification he did the sensible thing and took them to the Micropalaeontology Department at UCL for identification. Alan Lord [b. 1942], now an honorary co-worker at the Senckenberg Forschungsinstitut in Frankfurt, agreed they looked like ostracods, but being more familiar with Mesozoic forms, suggested they consult ostracod expert (and polymath) Eric Robinson [b. 1929]. Robinson immediately identified the 'ostracods' as very resistant seeds from local blackberry bushes and consoled Duffin by assuring him that generations of micropalaeontologists had made the same mistake.

### Misunderstandings

No geological theories were harmed by that palaeontological misunderstanding. But a similar type of mistake in fossil identification held back the interpretation of the regional geological setting of The South Orkney Islands and the understanding of the geological history of Antarctica for more than 75 years.

The South Orkney Islands, located approximately eight hundred kilometres east of the tip of the Antarctic Peninsula, were first discovered in 1821 in the course of a voyage of exploration for sealing grounds. The first geological observations were made by a French expedition in 1838, but it was not until



Factory Cove with Signy Research Station, Signy Island, South Orkney Islands (Ben Tullis, Wikipedia CC BY 2.0)

1902 that the first rock samples were collected by the Edinburgh-based Scottish National Antarctic Expedition on the ex-whaling ship, *Scotia*. The geologist on board was Dr James Hunter Harvey Pirie [1878 – 1965], who also served as the expedition's medical officer and carried out bacteriological research.

The western islands in the South Orkney group are underlain by a metamorphic complex. In contrast, the smaller islands in the eastern part of the chain are composed of a sequence of greywacke and shale which closely resemble the Palaeozoic greywackes found in the Southern Uplands of Scotland. So when the samples were returned to Scotland, it was not too surprising that on examination by eminent geologists, including Benjamin Peach [1842 – 1926] and the graptolite expert Gertrude Elles [1872 – 1960], the indistinct fossil remains they contained were reported to be graptolites, a group of marine animals that appeared during the Cambrian and went extinct around 320 million years, during the Carboniferous.

One of the small islands in the eastern part of the group was christened Graptolite Island, and Elles identified the fossils as a species of *Pleurograptus*. On the basis of this lithological and fossil evidence the rocks were assumed to be of Lower Palaeozoic age. The idea that the rocks contained graptolites persisted until 1957, when the samples were re-examined and the 'graptolites' were identified as Triassic plant material.

### Welcome to the club!

But the story didn't end there. In 1977, further samples were collected from bedded cherts on a rocky islet between two of the smaller islands in the South Orkney chain. These were shown to contain Triassic radiolaria and Permo-Triassic conodonts – so the assumption that there were graptolites in the rocks of Graptolite Island turned out to be wishful thinking. The idea that the rocks were of Lower Palaeozoic age had to be scrapped too.

It's comforting to know that even the experts can be fooled. But we're all always learning. So as Robinson smilingly said to Duffin: Welcome to the club!

**End notes:** Sources for this vignette include Welcome to the club! by Chris Duffin, included in *Ericdotes*, a collection of stories in appreciation of Eric Robinson (copies are available to buy at [www.geologistsassociation.org.uk/shop](http://www.geologistsassociation.org.uk/shop)); Dalziel, I. W. D. 1979. The mythical graptolites of the South Orkney Islands. *The Edinburgh Geologist*, 6, pp. 2 – 9; Stone, Phil, 2003, Fossils from the South Atlantic, *The Edinburgh Geologist*, 41, pp 14 – 18. I thank Renee Clary of Mississippi State University, US for inadvertently drawing my attention to this story in another context!

\* **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](http://www.gravestonegeology.uk)



**OBITUARY****Sir Anthony Laughton 1927-2019**

**S**ir Anthony Laughton, Tony to his many colleagues, died on 27th September at the age of 92 after a short illness.

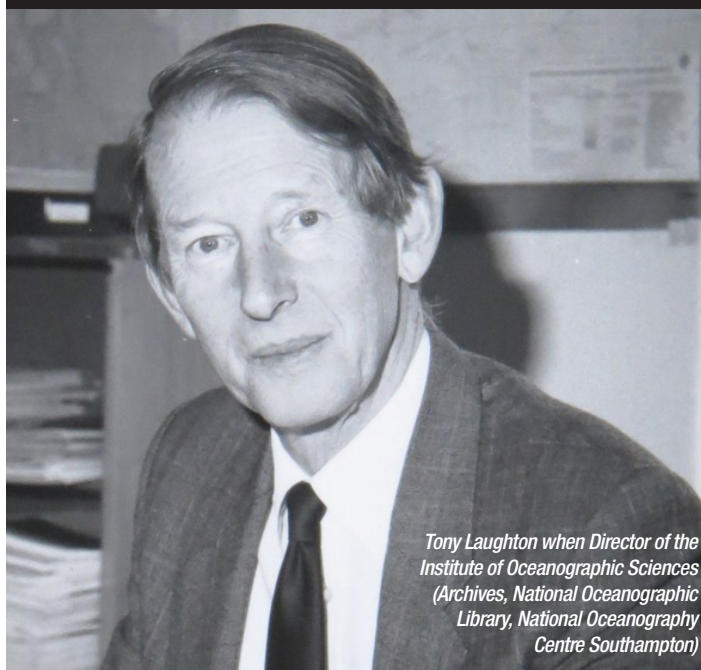
His career spanned the immediate post-war period to well into the 21st century. He rose to become Director of the Institute of Oceanographic Sciences from which he retired in 1988. He was a warm and approachable man who could charm but also someone who could be tenacious in the pursuit of what he thought was right.

### National Institute of Oceanography

After gaining a PhD in Cambridge University's marine geophysics group Tony joined the National Institute of Oceanography (NIO) in Wormley, Surrey. He built a deep-sea camera and within a year was able to take photos of the sea floor in depths down to 4800m. Concurrently he became interested in using the echo-sounder to map the sea floor, the start of a life-long interest.

A three-month geological/geophysical cruise in 1963, part of the International Indian Ocean Expedition, offered new directions for Tony's research. He began to consider how the geological development of the Gulf of Aden related to the history of the mid-ocean spreading Carlsberg Ridge. This led to the publication of seminal bathymetric and magnetic anomaly charts of the Gulf, which helped to tie in the history of the Red Sea with

**Former Director of the Institute of Oceanographic Sciences who received a knighthood for services to oceanography**



*Tony Laughton when Director of the Institute of Oceanographic Sciences (Archives, National Oceanographic Library, National Oceanography Centre Southampton)*

that of the northwest Indian Ocean.

In 1969 an NIO-designed, towed side-scan sonar instrument (GLORIA, or Geological LONG-Range Inclined Asdic) was used for the first time in open Atlantic conditions in a cruise led by Tony. Other surveys of the Mid-Atlantic Ridge followed, some using the vastly improved GLORIA Mk II which could survey 1100 square kilometres per hour.

Tony was one of the two Co-Chief Scientists for Deep Sea Drilling Project (DSDP) Leg 12 in 1970 with Bill Berggren, a micropalaeontologist from Woods Hole Oceanographic Institution. The expedition drilled nine sites in the

Labrador Sea, Reykjanes Ridge, Rockall Bank and the Bay of Biscay. Tony's involvement and interest in DSDP, and its subsequent incarnations, continued for many years afterwards.

### Publications and honours

Between 1975 and 1983 Tony, with others, published an important and widely used series of five bathymetric charts of the NE Atlantic at the scale of 1:2.4 million. Tony became involved in the General Bathymetric Chart of the Oceans (GEBCO) and joined its Guiding Committee at a crucial time when the specifications for GEBCO's new 5th Edition charts, later used in labs the world over,

were being formulated. Eventually Tony became Chairman of GEBCO's Guiding Committee in which role he continued until the Centenary of GEBCO in 2003. Subsequently, with others, he set up a GEBCO training programme, now in its 16<sup>th</sup> year, in undersea mapping funded by the Nippon Foundation at the University of New Hampshire.

Tony Laughton became Director of the Institute of Oceanographic Sciences (1978), a Fellow of the Royal Society (1980) and was awarded a knighthood in the Queen's birthday honours of June 1987 for 'services to oceanography'.

Tony had interests beyond science which included music - he played French horn in two orchestras for many years - dinghy sailing, gardening and woodwork. He leaves his wife Clare and their daughters Rebecca and Susanna, Andrew his son from his first marriage, and three grandchildren.

*By Bob Whitmarsh, with assistance from John Gould, Gwyn Griffiths and Clare Laughton*

► The full version of this obituary appears online. This obituary is a shortened version of one that first appeared in *Ocean Challenge*: Whitmarsh, R.B., 2020. Sir Anthony Laughton DSc, FRS (1927-2019). A tribute to a leading light of UK oceanography. *Ocean Challenge*, Vol. 24, No.1, 6-7, reproduced with kind permission. *Editor*.



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servicing science, profession & society

1 October 2020



Scottish  
Poetry  
Library



### Activities Include:

- Schools Geopoetry competition winners.
- Poets and Geologists telling their stories about rocks, poems and influences interspersed with readings (SPL) with contributions by **Sarah Acton** (Poet in Residence, Jurassic Coast), **Michael McKimm** (Geological Society) and **Norman Bissell** (Scottish Centre for Geopoetics).
- Geopoetry Workshop: individuals present poems for discussion and feedback.
- Edinburgh/Scottish Poets with geological gifts, **Ken Cockburn** (Edinburgh Poetry Tours), at Panmure House.

### Organising Committee

Patrick Corbett, Heriot-Watt University  
[p.w.m.corbett@hw.ac.uk]  
Stuart Harker, Consultant  
Phil Ringrose, Equinor/NTNU, Norway  
Bob Gatliff, BGS  
Michael McKimm, EGS  
Asif Khan, Scottish Poetry Library  
Peter Anning, Central Scotland Regional  
Group (GSL)  
Dorrik Stow, Heriot-Watt University  
Tim Duffy, BGS  
Lara Reid, Friends of Hugh Miller Society  
Norman Bissell, Scottish Centre  
for Geopoetics



# GEOPOETRY 2020

## — Edinburgh —



### Taking place virtually - Zoom

This event is to follow up the first Geological Society of London's GEOPOETRY day in 2011. Rocks have long inspired poets (refer to Burns' "O my Luve's like a red, red rose" poem of 1794):

"Till a' the seas gang dry, my dear,  
And the rocks melt wi' the sun"

To the present day poets are similarly inspired. Michael McKimm's *Fossil Sunshine* (2013) and "MAP, Poems after William Smith's Geological Map of 1815" (2015) showed how geological subject matter from Geopoetry 2011 could inspire poets: "...the poems here make Smith's map anew in moving and surprising ways." The *Jurassic Coast Poems* (2017) by Sarah Acton, the Jurassic Coast resident poet, shows continued inspiration:

"We hear the red rock  
Speak in ripples"

This gathering, to be held on National Poetry Day (1st October, 2020) is hosted by the Geological Society of London (in conjunction with the Central Scotland Group), The Scottish Poetry Library and the Edinburgh Geological Society and will bring together poets and geoscientists to further encourage the rocks to speak.

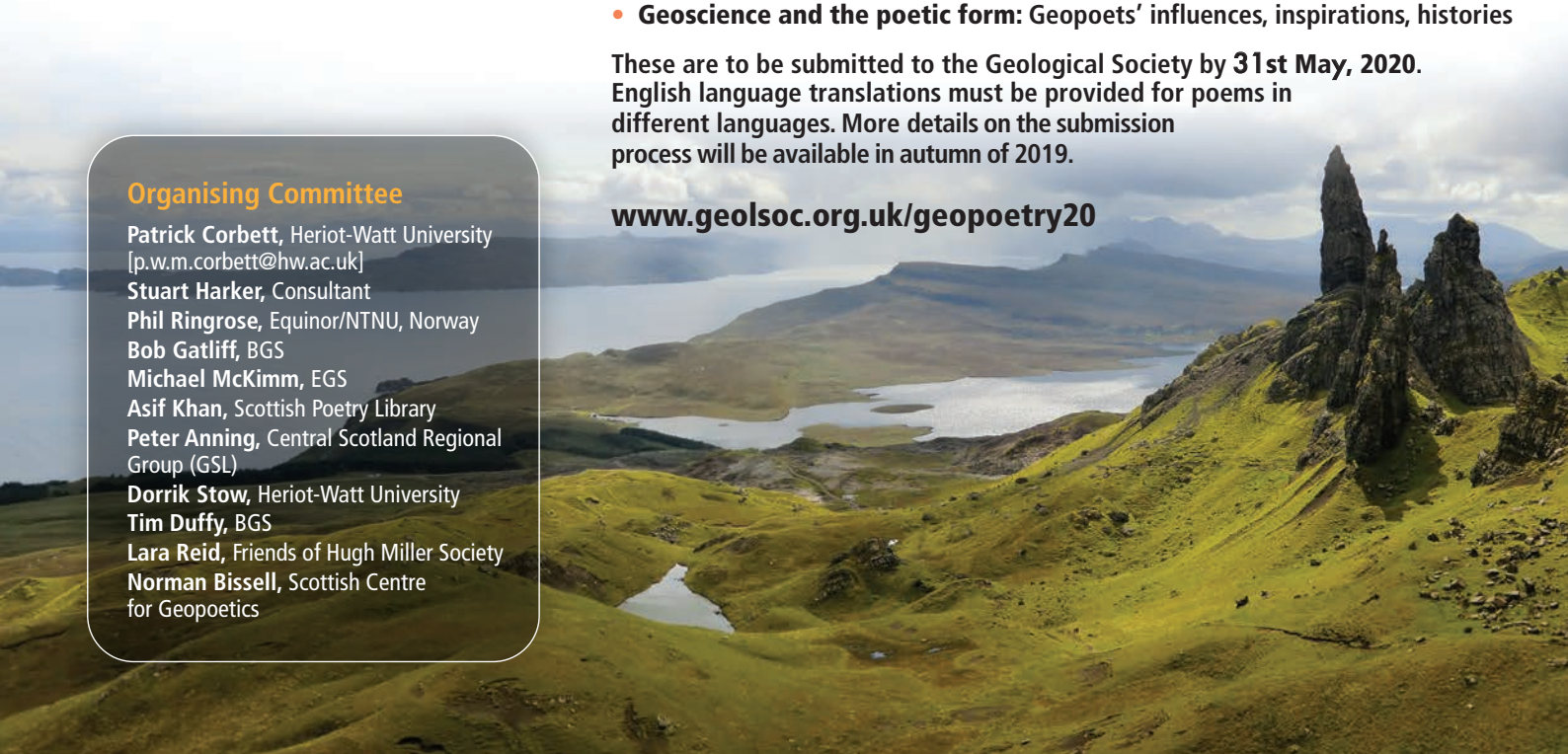
### Proposed themes and activities

The organisers will be seeking contributions, which will form the basis of a programme of talks, walks, readings and workshops and ultimately a publication, in the following areas:

- **Geo-themes:** poetry about rocks, geologists, geological sites
- **Geo-images:** poetry that uses earth and ocean images
- **Geology and Society:** poetry drawn from earth and society interaction
- **Geoscience and the poetic form:** Geopoets' influences, inspirations, histories

These are to be submitted to the Geological Society by **31st May, 2020**. English language translations must be provided for poems in different languages. More details on the submission process will be available in autumn of 2019.

[www.geolsoc.org.uk/geopoetry20](http://www.geolsoc.org.uk/geopoetry20)





The  
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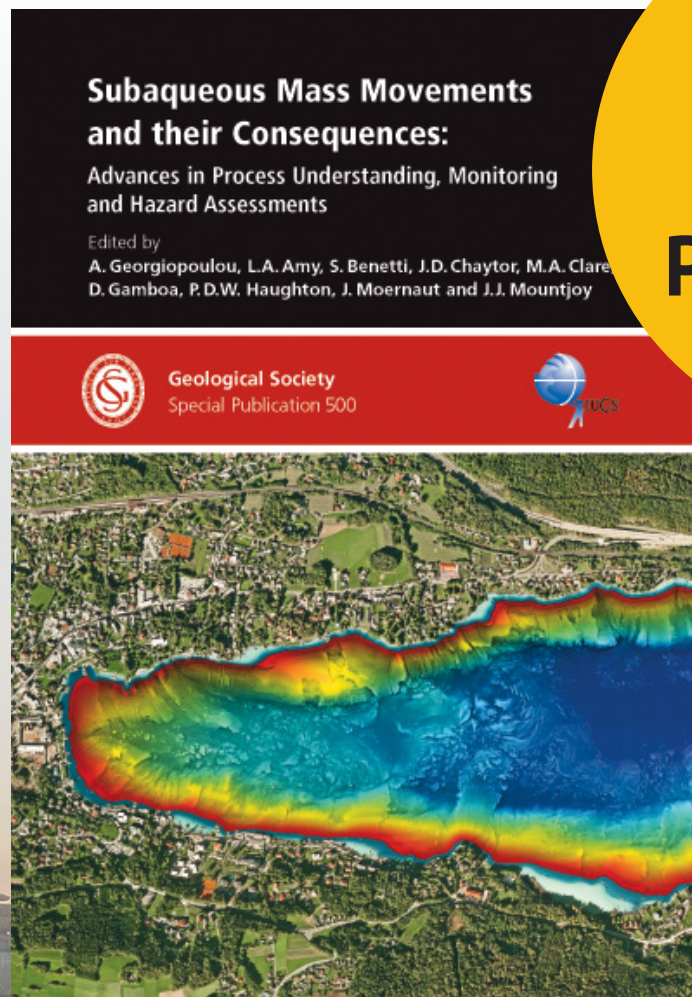
**Lyell**  
Collection

Geological Society publications online



# Subaqueous Mass Movements and their Consequences: Advances in Process Understanding, Monitoring and Hazard Assessments

Edited by A. Georgiopolou, L.A. Amy, S. Benetti, J.D. Chaytor, M.A. Clare, D. Gamboa,  
P.D.W. Haughton, J. Moernaut and J.J. Mountjoy



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