Bulletin of the North Staffordshire Group of the Geologists' Association

Number 144 : May 2026

Dates for Your Diary

Summer Field Programme 2026:

Sunday 26 April (postponed)	**Lathkill Dale:** Leader – Dr Vanessa Banks (BGS)
12 to 14 June	**WGCG weekend field trip – South Shropshire.** Leader: Dr Martin Whiteley (NSGGA members welcome)
Thursday 18 June @ 19:00	**Goyt's Moss (Derbyshire Bridge):** Leader: Gordon McKeown (NSGGA) (26th June alternative if weather poor)
Saturday 12 September @ 10:30	**Bradgate Park (including Precambrian outcrops with Charnia fossils):** Leader - Dr. J. Carney (BGS)
Triassic Day trip (May or July)	**Dr Bernard Besly is looking for a trip leader.**

NSGGA members have been invited to attend the field trips which the East Midlands Geological Society (EMGS) are running through the summer – including their weekend excursion in September. Details of these are provided in the 'Activities of Other Societies Section'.

EMGS website https://www.emgs.org.uk/field-trips.html

Proposed NSGGA Lecture dates for later in the year are:

- **8 October 2026 (*this will include a free buffet after the lecture*)**
- **12 November 2026**
- **10 December 2026 (*XMAS Social*)**
- **21 January 2027**
- **18 February 2027**
- **18 March 2027 (*AGM*)**

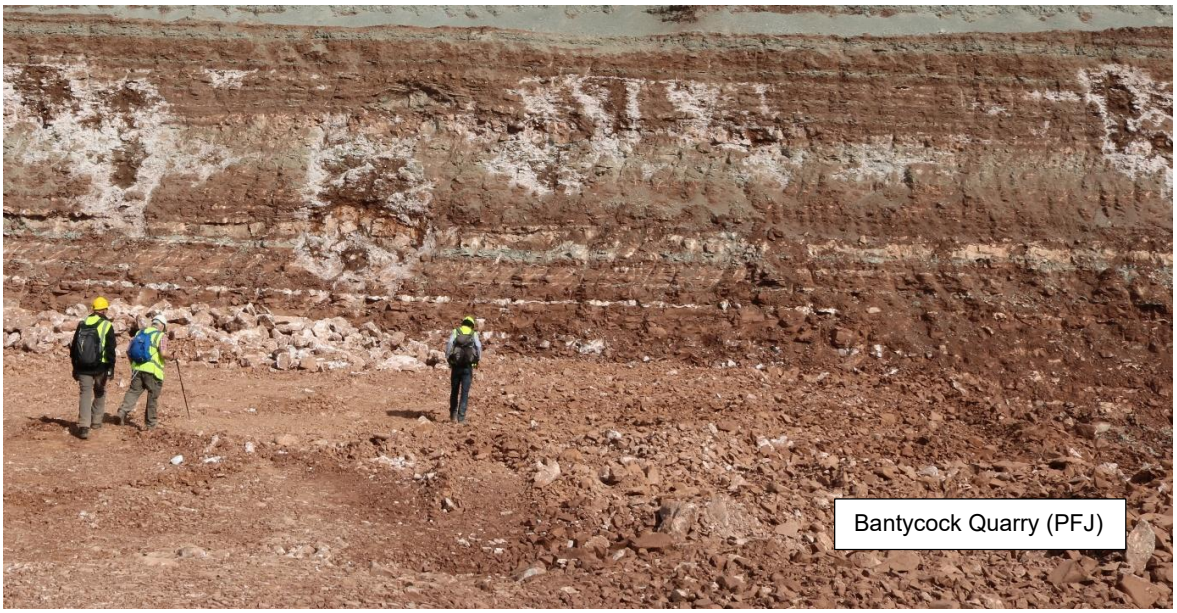
Winter Lecture Programme 2026

Date: Thursday 19th February 2026 at 19:30.

Red beds, rotten ground and why the Triassic still pays the bills

Dr Oliver Wakefield

(Regional Geologist, Midlands & East Anglia; British Geological Survey).



Bantycock Quarry (PFJ)

The Triassic is often dismissed as a sea of red rocks (red beds) with little to recommend it beyond filling the gaps between more glamorous periods. In reality, it underpins much of central Britain, both physically and economically, forming the quiet geological backdrop to everything from water supply to subsurface energy and storage.

The talk explored two very different faces of the Triassic. On one hand are the highly permeable sandstones of the Sherwood Sandstone Group: laterally extensive, hydraulically connected, and central to debates around groundwater resilience, geothermal energy, hydrogen storage, and carbon capture and storage. On the other is the Mercia Mudstone Group — frequently waved away as "just mudstone" until it triggers ground instability, sulphate attack, or other uncomfortable meetings with engineers. Its variable lithology, evaporite content, and complex engineering behaviour reveal a unit that is anything but simple.

Using the Triassic as a case study, the talk also asks a broader question: how should geologists communicate complexity, uncertainty, and risk to non-specialists? It argues for geology that is not over-simplified but translated — framed in ways that make sense to planners, engineers, and the public, and that presents the subsurface not merely as a constraint, but as an opportunity.

Date: Thursday 12th March 2026 at 19:00.

AGM & Chair's Address

Deep Geothermal Energy in the UK: Insights from the Pennine and Cheshire Basins.

This is a short article summarising the 2026 NSGGA Chair's address presented on the 12th March - provided by Dr. Stuart Egan (NSGGA Chair)

The Chair's Address at the 2026 AGM provided an overview of the current status and future potential of deep geothermal energy in the UK. The talk focused on the geological controls on geothermal resources, recent national developments, and new research into the thermal structure of the crust beneath northern England and the Cheshire Basin, much of which has been carried out at Keele University by postgraduate researchers.

What is geothermal energy?

The presentation opened by outlining what is meant by geothermal energy, broadly defined as heat derived from the ground at depths ranging from near-surface soils to several kilometres into the Earth's crust. The distinction was made between shallow (ground-source) geothermal energy, which is widely used in the UK for heating buildings via ground source heat pump systems, and deep geothermal energy, which exploits the natural increase in temperature with depth to provide heat and, under favourable conditions, electricity generation. Deep geothermal energy is of particular interest because it is a low-carbon, continuous energy source that can contribute to long-term decarbonisation, especially for heating.

What are the sources of deep geothermal energy?

A key concept introduced early in the presentation was the geothermal gradient, the rate at which temperature increases with depth in the Earth. In the UK, the average crustal geothermal gradient is approximately 27°C per kilometre. Using this value, temperatures of around 40°C at 1 km depth and over 147°C at 5 km depth are achievable in some locations, sufficient for district heating and, at the upper end, electricity generation. However, the talk emphasised that geothermal gradients are highly variable, and that local geology plays a critical role in enhancing or suppressing geothermal potential.

Several geological mechanisms capable of increasing subsurface temperatures were reviewed. These included magmatic heat sources, such as those found beneath Iceland, where geothermal gradients exceed 100°C per kilometre due to shallow magma beneath the Mid-Atlantic Ridge. Although the UK lacks such tectonic settings, it does host extensive radiogenic granites, particularly in southwest

England and northern England (Figure 1). These granitic bodies are enriched in radioactive elements such as uranium, thorium and potassium, whose decay generates significant heat. Rocks of this type form what are known as Hot Dry Rock geothermal systems, which can reach temperatures of 150–300°C at relatively modest depths.

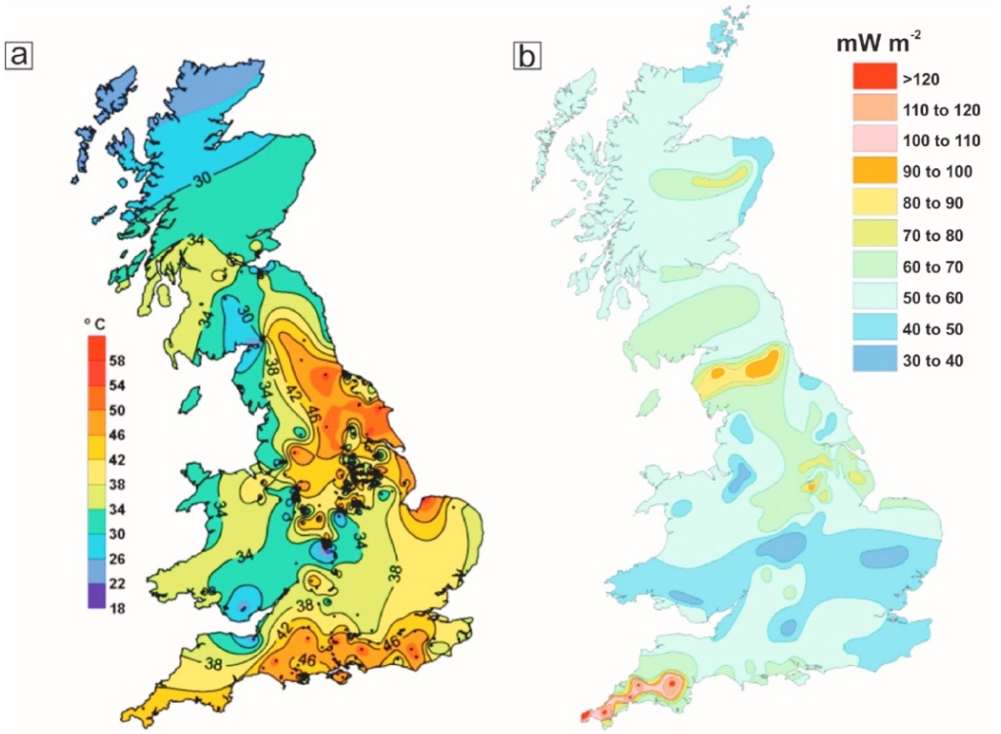


Figure 1: a) UK subsurface temperature map for 1 km depth. **b)** UK heat flow map (from Busby et al., 2011)

The status of deep geothermal energy in the UK

The address then turned to the UK's current geothermal energy landscape. In global terms, the UK remains a minor producer of geothermal energy, contributing only a small fraction to the national energy mix. Nonetheless, several important projects demonstrate the country's underlying potential. The longest-running example is the Southampton District Energy Scheme, operational since 1986, which uses hot saline groundwater from a Triassic sandstone aquifer at approximately 1.8 km depth to supply heat to buildings. More recently, the United Downs Deep Geothermal Power Project in Cornwall has become the UK's first geothermal facility to generate electricity at grid scale. This project exploits high temperatures within the Cornubian granite batholith, using wells drilled to depths greater than 5 km, and has attracted considerable attention because of its innovative integration of energy production with lithium extraction.

Geothermal potential of the Pennine Basin, northern England

The second half of the Chair's Address focused on two detailed case studies designed to illustrate how geological modelling can be used to assess geothermal potential in areas where direct subsurface data are sparse. The first case study examined northern England, including the Lake District, North Pennines and

surrounding sedimentary basins. This region is characterised by a distinctive block-and-basin structure formed during Carboniferous extension, with deep sedimentary basins flanked by uplifted blocks underlain by granite batholiths (Figure 2).

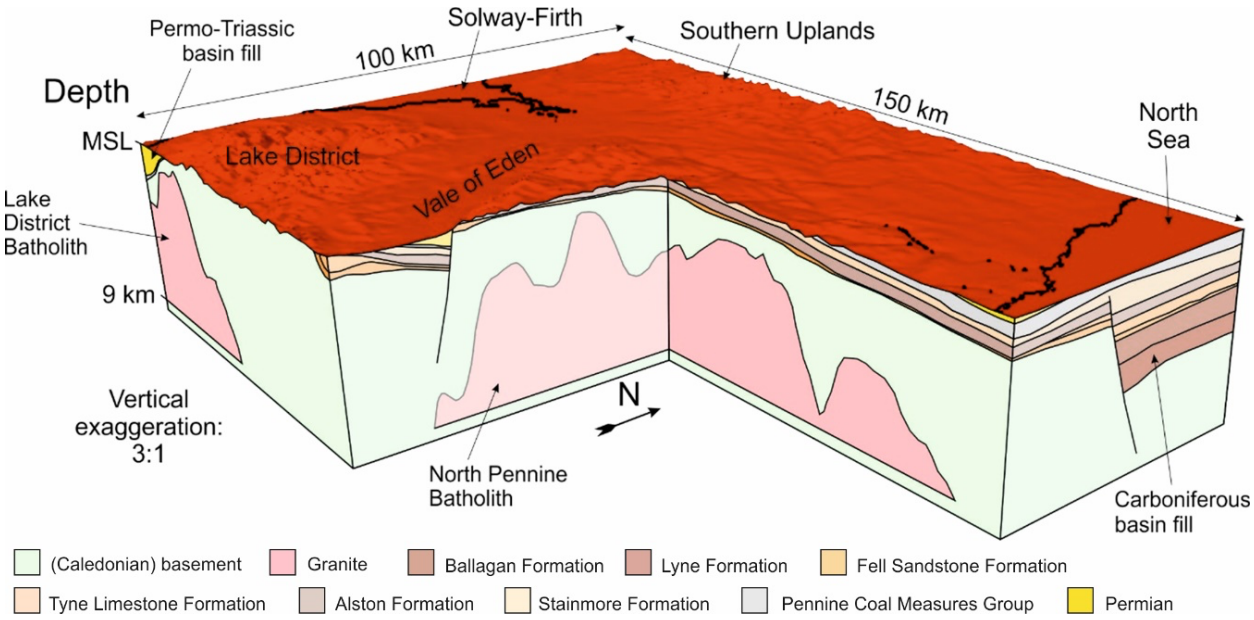


Figure 2: 3D Geological Model of Northern England (Howell, 2021).

Because temperature measurements from deep boreholes in this area are limited, a 3D numerical heat-flow model was developed to predict subsurface temperatures. The model integrates geological structure, thermal conductivity, radiogenic heat production and boundary conditions extending to the base of the lithosphere. Results from the model show that the highest temperatures at shallow crustal levels are closely associated with the North Pennine and Lake District granites. At 1 km depth, temperatures locally exceed 45°C, while at 5 km depth they reach over 150°C above these batholiths.

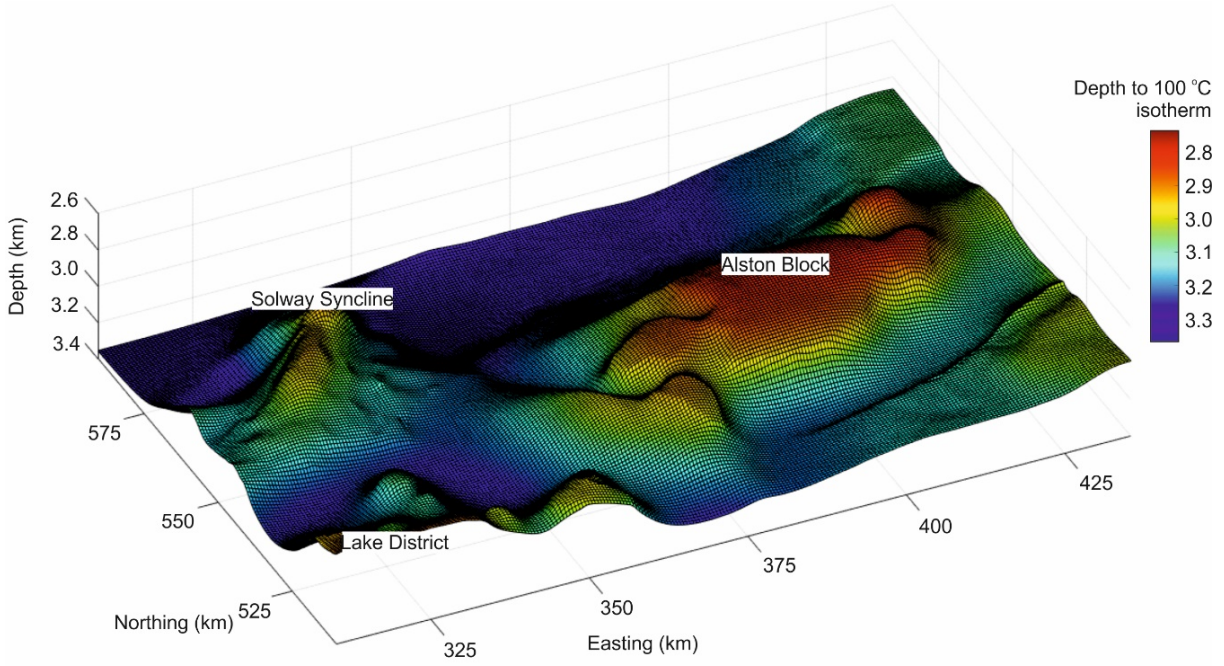


Figure 3: The depth below surface to 100^{0}C isotherm based on a numerical 3D regional temperature model. 100^{0}C holds significance as it marks the temperature at which electricity can be generated by powering turbines (Howell, 2021).

One particularly important output of the model is a map showing the depth to the 100°C isotherm, commonly regarded as the threshold temperature for electricity generation (Figure 3). In parts of northern England, this temperature is predicted at depths of between approximately 3.0 and 3.5 km. These results indicate that the region has genuine geothermal potential, particularly where radiogenic granites coincide with deep sedimentary aquifers. However, the talk also noted a significant practical limitation: much of northern England is relatively sparsely populated, which may restrict the economic viability of large-scale geothermal developments unless linked to specific industrial or district-heating demands.

Geothermal potential of the Cheshire Basin, northwest England

The second case study examined the Cheshire Basin, a Permo-Triassic sedimentary basin closer to home for many NSGGA members. Unlike northern England and southwest England, the Cheshire Basin does not contain granitic intrusions and therefore relies entirely on hot sedimentary aquifers for geothermal potential. These aquifers occur mainly within the Sherwood Sandstone Group and deeper sandstones of the Appleby Group, buried beneath thermally insulating mudstones of the Mercia Mudstone Group. As with the northern England study, the lack of deep borehole data necessitated the use of 3D thermal modelling to predict temperature distributions within the basin. Results (Figure 4) indicate that temperatures increase systematically with depth, reaching approximately 27°C at 1 km, around 58°C at 3 km, and a maximum of about 84°C at 5 km in the deepest sub-basins. These values fall short of those required for electricity generation but comfortably exceed the threshold needed for district heating. The modelling

suggests that the Cheshire Basin's geothermal potential is best suited to supplying heat rather than power, particularly for urban centres, such as Crewe, located above the deeper parts of the basin. The geological configuration is favourable in that permeable sandstone reservoirs are overlain by mudstone seals, creating conditions well suited to sustainable geothermal heat extraction.

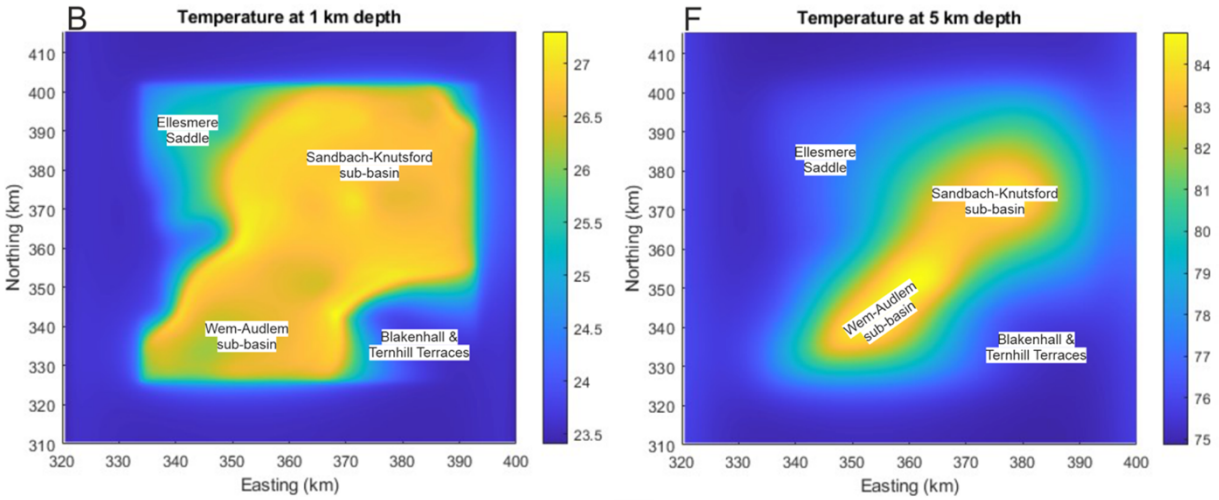


Figure 4: Modelled temperature beneath the Cheshire Basin at depths of 1 and 5 km (Graveling, 2026)

In conclusion, the Chair's Address emphasised that while the UK has been relatively slow to adopt deep geothermal energy, this reflects geological and demographic constraints rather than a lack of resource. Recent projects, particularly United Downs, demonstrate that deep geothermal energy can be technically viable in the UK when geological conditions are favourable. Importantly, numerical modelling now provides a powerful tool for identifying prospective areas and reducing exploration risk. Although deep geothermal energy is unlikely to become a dominant contributor to the UK energy mix, it has clear potential to play a valuable role in low-carbon heating and local energy systems. The talk closed by acknowledging the contributions of postgraduate researchers involved in this work and by encouraging continued interest in geothermal energy as part of the UK's transition to a more sustainable energy future.

Acknowledgements

The Chair would like to acknowledge the following co-workers: Chris Brown, Nigel Cassidy, Harry Graveling, Dan Griffiths and Louis Howell

References and further information

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- The UK Geoenergy Observatories. https://www.ukgeos.ac.uk
- United Downs Deep Geothermal Power Project. https://gel.energy/about/united-downs/

Field Reports

EMGS field trip along the Monsal Trail
Sunday 12th April 2026

Leader: Dr. Peter Gutteridge

We were invited to join this fieldtrip with the East Midlands' Group along the Monsal Trail between Millers Dale and Monsal Head. This exposes an almost continuous record of the evolution of the Derbyshire carbonate platform from the Asbian through to the Brigantian. The excursion entailed a 7km walk along the well surfaced Monsal Trail through tunnels with a final short steep section on a rough track back up to Monsal Head.

NSGGA News

NSGGA - Next Committee Meeting:

Thursday 28th May, 2026 @ 7pm via Zoom.

Membership Renewal

At the last NSGGA committee meeting (19/3/2026), it was agreed that membership for students should be free.

NSGGA Membership runs from October to October so you should have renewed your membership for 2025/2026 by now. Full membership remains £13; family membership £15; retired/unwaged £10. **Student membership is now free.**

The simplest way to renew is by electronic money transfer to the NSGGA Account, using the reference part to indicate what you are paying for.

- *Sort Code: 20-59-23*
- *A/C Number: 60494704*
- *Account Name: North Staffs Group of the Geologists Association*

Reference: What you are paying for, e.g. "1xFull Member"
If you wish to pay by cheque, or indeed join the NSGGA, please complete the form at the end of the Bulletin.

NSGGA Committee

As a result of the AGM (12/3/2026), we have almost a complete contingent of executive officers but **we do not as yet have a Vice-Chair**.
We welcome Miranda Goodby who has joined the Committee.

Chair: Stuart Egan (e-mail: nsgga.cha@gmail.com)
Vice-Chair: Vacant position
General Secretary: Stephen Addison (email: nsgga.sec@gmail.com)
Treasurer: Tony Marks (4 Scarratt Drive, Forsbrook, Stoke-on-Trent, ST11 9AN; email: welsh_tony@tiscali.co.uk)
Membership Secretary: Janet Osborn (Stretton, 2 Croyde Place, Meir Park, Stoke-on-Trent, ST3 7XD; email: janetmosborn@googlemail.com)
Speakers Secretary: Peter Jones (e-mail: p.f.jones@derby.ac.uk)
Field Secretary: Steve Alcock (Longfields, Park Lane, Cheddleton, near Leek ST13 7J; e-mail: steves261@aol.com)
GeoConservation Staffordshire Liaison Officer: Dr Ian Stimpson (e-mail: igs@nsgga.org)
Bulletin Secretary: Adrienne Noble (e-mail: nsgga.bul@gmail.com)
Social Media Secretary: Will Shaw (e-mail: nsgga.soc@gmail.com)

Honorary Life Member: Ann Myatt
Executive Committee (elected): Bernard Besly, John Reynolds, Miranda Goodby

We are always on the look-out for "new blood" to join the executive committee. If you would like to stand for a particular position, just join the committee in an ex-officio role to see it in action first, or are just curious as to what it might involve, please contact the Chair, Stuart Egan (nsgga.cha@gmail.com

Peter Jones and Steven Alcock have confirmed that they only want to do one more year in their respective roles. This means that we urgently need replacements for these roles especially the Field Secretary role as planning for next year's field trips typically starts in the Autumn of this year.

NSGGA web pages: www.nsgga.org

Events of Other Societies

Geologists' Association

Lectures at The Geological Society, Burlington House, Piccadilly W1V 0JU.

Friday May 8 @ 18:00	**Hybrid: President's Address** - *Little things can make a big difference (part 2)* – Dr. Liam Gallagher
Friday 5 June	**Zoom:** *Title tbc* - Prof Simon Conway-Morris
Friday 3 July	**Zoom:** *Title tbc* - Dr Emily Swaby

More details at www.geologistsassociation.org.uk

Black Country Geological Society

Indoor meetings at Lamp Tavern at 116 High Street, Dudley, DY1 1QT.

Saturday 9 May	**Field Event:** *BCGS* @ Perton Library Science Fair
Saturday 9 May	**Geoconservation Event:** Morning @ Smestow Valley
Saturday13 June	**Field Event:** Dudley Museum and Archive - Graham Worton
Sunday 5 July	**Field Event::** Burton Dassett, Warwickshire - Ray Pratt (WGCG)
Saturday 25 July	**Field Event:** Bewdley Museum & Bewdley - Liz Cowley & Andrew Harrison

More details at www.bcgs.info

Cumberland Geological Society.

For further information please visit the website: https://www.cumberland-geol-soc.org.uk/

Wednesday May 13 @ 19:30	**Lecture:** *A Random Walk in the Caledonian Orogen* - Bernard Skillerne de Bristow
Wednesday June 3	**Field Trip:** Ingleborough - Bernard Skillerne de Bristow
Wednesday June 17	**Field Trip:** *Seathwaite Fell* – David Hasleden
Wednesday July 8	**Field Trip:** *Windermere Supergroup* – Dave Kelly
Monday July 27	**Field Trip:** *Sourmilk Gill* - John Lackie
Wednesday August 5	**Field Trip:** *Eycott Volcanic Group* – Ian Francis

East Midlands Geological Society

Indoor meetings at the Clive Granger Building, University of Nottingham. NG7 2RD and start at 18:00.

Wednesday June 3	**Field Trip**: *Evening: Mercia Mudstone in the Trent Trench, Radcliffe on Trent* - Dr Andy Howard
Saturday July 25	**Field Trip:** *Jurassic rocks & landscapes in the Stamford area* - Mark Barron
August (TBC)	**Field Trip:** *The Frodingham Ironstone@ Dragonby Mine, near Scunthorpe* - Nick Hardie
September 11 to 13	**Weekend**: *Malverns, River Severn cliffs & Cleeve Hill (joint trip with the WGCG)* - Dr Nick Chidlaw

More details at www.emgs.org.uk

East Midlands Regional Group of the Geological Society
De La Beche Conference Suite, British Geological Survey, Keyworth, Nottingham
More details at www.geolsoc.org.uk/emrg
See entry below for **North West Regional Group of the Geological Society**

Liverpool Geological Society
All talks for 2026 will take place at the Central Teaching Hub, University of Liverpool and start at 19:30.

June 6 to 8	**Weekend:** *Jurassic Coast* - Pete Burgess
Sunday August 8	**Field Trip:** *Shap Pink Quarry in eastern Cumbria*
Sunday September 13	**Field Trip::** *Brymbo Fossil Forest near Wrexham*

More details at liverpoolgeologicalsociety.org

Manchester Geological Association
Indoor meetings at the Williamson Building, University of Manchester.

Sunday June 7	**Field Trip:** *Todmorton (with YGS): The six inch coal and Subcrenatum Marine band*
Sunday June 14	**Field Trip:** *Alderley Edge, Triassic*
Sunday July 5	**Field Trip:** *Lyme Park (provisional). Carboniferous and Quaternary*
Sunday July 26	**Field Trip:** *Trowbarrow, possibly with a quarry visit, Carboniferous limestone.*
Sunday August 16	**Field Trip:** *Hulme Quarry, Park Hall Country Park, Triassic of north Staffordshire*

More Details at www.manchestergeology.org.uk

North West Regional Group of the Geological Society
More details at www.geolsoc.org.uk/Groups-and-Networks/Regional-Groups/North-West
Lectures available for public access at Burlington House, W1J 0BG, or via Zoom.
https://www.geolsoc.org.uk/events/

Shropshire Geological Society
Meetings currently hybrid via ZOOM and at Shrewsbury Colleges Group, London Road, Shrewsbury SY2 6PR

Thursday May 13 @ 19:15	**Hybrid: Geology of the Mantle** - Prof Johan Lissenberg (University of Cardiff)

More details at www.shropshiregeology.org.uk/SGS/SGSintro.html

Warwickshire Geological Conservation Group
Indoor meetings at Kenilworth St Francis of Assisi Church, Kenilworth CV8 1LQ and via Zoom.

Thursday May 14 @ 19:30	**Zoom:** *The Geology of Shropshire – Martin Whiteley*
Sunday May 24	**Field Trip:***Solihull Urban Geology Trail* – Ray Pratt

Monday May 25 **Field Trip:** Warwickshire Museum Jurassic Collection

Register in advance to attend virtually:
https://us02web.zoom.us/meeting/register/WNDsw2L8Q1CYSg_AUxmBxQ
More details at www.wgcg.co.uk

West Midlands Regional Group of the Geological Society
More details at www.geolsoc.org.uk/Groups-and-Networks/Regional-Groups/West-Midlands
See entry above for **North West Regional Group of the Geological Society**

Western Institute of Mining and Minerals
Indoor meetings are held at the William Smith Building, Keele University, 7.00pm - 9.00pm, and via Zoom.

www.iom3.org/group/western-institute-of-mining-and-minerals-wimm/meetings.html

Produced for the NSGGA by Adrienne Noble, NSGGA Bulletin Secretary

NSGGA MEMBERSHIP 2026/2027. Subscriptions due from October 1st

Membership Rates

Ordinary (Full)	£13.00	❒
Family *	£15.00	❒
Retired/Unemployed	£10.00	❒
Student **	£ 0.00	❒ Course: ……

Voluntary Contribution to Myers Award: £…..

The John Myers Award is presented annually to a student at Keele University. John Myers gave a 60-year contribution to the understanding of Geology in North Staffordshire and beyond. From 1927 he taught at Wolstanton Grammar School for 40 years and began evening classes at "Stoke Tech" [now Staffordshire University], encouraging members to join the Geologists' Association of London. Thus was born the NSGGA in 1948. In the 1950s and 60s he helped Keele University Postgraduate Certificate of Education students with a teaching methods course, joining the staff of the Education Department in 1967 on his retirement from teaching. Also, in 1967, he was a Founding Father of the Association of Teachers of Geology that had its inaugural meeting at Keele, at which he was elected Treasurer, a post he held for 10 years. His daughter Ann has generously funded the John Myers Awards in his memory.

Continuing Members (New Members please see below)

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Sort Code: 20-59-23 A/C Number: 60494704
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New Members

Please complete the form both above for membership type and below for UK GDPR and return to the membership secretary
Name
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For our records, are you currently a member of the national GA ? yes ❒ no ❒
I consent to you contacting me (please tick appropriate boxes)

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* For insurance purposes, please list the names of all members of the household to be included in the table above for family membership
** Students please name your **full-time** course at top of form

You can pay either directly using internet banking (details above) or by cheque (details below)
Cheques should be made payable to the: "***NSGGA***" and sent to:
Janet Osborn (NSGGA Membership Secretary),
Stretton, 2 Croyde Place, Meir Park, Stoke-on-Trent, ST3 7XD.
e-mail: janetmosborn@googlemail.com