

Geoscientist

The Fellowship magazine of The Geological Society of London | www.geolsoc.org.uk | Volume 22 No 2 | March 2012

[READ GEOLSOC BLOG!]
GEOLSOC.WORDPRESS.COM

VOTE! VOTE! VOTE!

Last chance to
vote for new Council

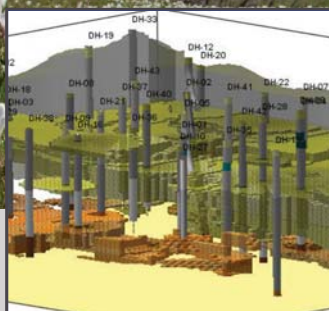
MAPPING THE FUTURE

From paper maps to
digital 3D NGM

ROAD TO SHANGRI-LA

Industry brings geoscience education
to the peoples of the High Himalaya

Not Just Software... RockWare. For Over 29 Years.

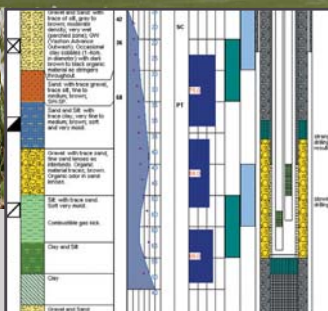


RockWorks®

3D Data Management, Analysis and Visualization

- Powerful measured-section/borehole database for managing:
 - Lithology
 - Stratigraphy
 - Hydrology
 - Fractures
 - Hydrochemistry (e.g. Contaminants)
 - Geophysics
 - and more
- Create striplogs, cross-sections, fence diagrams, and block models
- Contour data in 2D and 3D (isosurfaces)
- Extensive on-line help and sample data sets
- Includes RockWorks Utilities

\$3,000

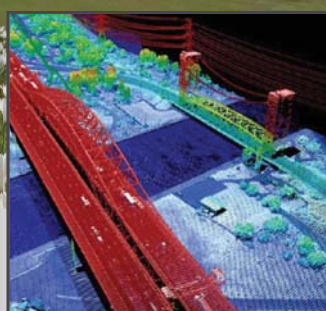


LogPlot®

Powerful, Flexible, Easy-to-Use Borehole and Well Log Software

- Dozens of templates available or design your own in the drawing-style log designer window
- Tabbed data sheets
- Import/Export data from LAS, Excel, RockWorks
- Paginated and continuous logs at any vertical scale
- Export to a variety of formats
- Free viewer can be distributed to clients

\$699

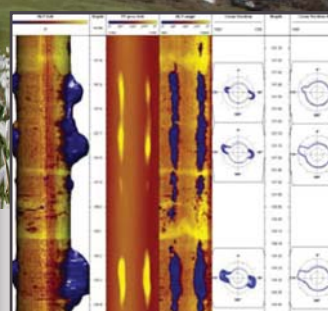


MARS®

Data Processing for Airborne, Terrestrial and Mobile LiDAR Datasets

- 64-bit support for all Windows operating systems
- Capable of loading LiDAR (LAS), imagery (RGB and hyperspectral) and GIS vectors
- Supports WMS imagery, including Bing Maps
- Batch generate DEMs and elevation contours
- Automated and manual LiDAR filtering tools
- Allows multi-core processing for more efficient use of PC hardware
- 3D coordinate transformation support for LAS files (horizontal and vertical)

\$4,995



WellCAD™

Well Log Data Management

- PC-based composite log package, combining comprehensive graphic editing and data processing tools
- Formula parser for log analysis
- Fracture and breakout analysis
- Optional modules for core logging, image analysis, LIS/DLIS import, sonic processing, deviation calculations, ODBC connectivity, automation and cross-section generation
- Integrates all data acquired in a well into a single document
- Combines excellent display, editing and analysis capabilities for well data

\$3,120



RockWare®

Since 1983

RockWare.com

European Sales

**+ +41 91 967 52 53 • F: + +41 91 967 55 50
europe@rockware.com**

US Sales

**303.278.3534 • F: 303.278.4099
sales@rockware.com**

Free trials for most of our products available at www.rockware.com

Follow us on:



IN THIS ISSUE

MARCH 2012



12 COVER FEATURE: ROAD TO SHANGRI-LA
Jonathan Craig *et al.* on teaching geoscience
and energy efficiency in the high Himalaya



06



19

FEATURES

- 19 THE END OF THE MAP?** Martin Smith and Andy Howard explain how the digital 3D National Geological Model represents the 'coming of age' of William Smith's great vision

REGULARS

- 05 WELCOME** Relinquishing old ways and stereotypes is hard but necessary work, says Ted Nield
- 06 GEONEWS** What's new in the world of geoscientific research
- 08 SOCIETY NEWS** What your Society is doing at home and abroad, in London and the regions
- 11 SOAPBOX** Tell me a story - Iain Stewart thinks the answer to raising geosciences' profile lies in their narrative
- 22 LETTERS** We welcome your thoughts
- 24 PEOPLE** Geoscientists in the news and on the move
- 26 BOOK & ARTS** Two reviews by Julian Vearncombe and David Manning
- 28 OBITUARY** A distinguished Fellow remembered
- 27 CALENDAR** Society activities this month
- 29 CROSSWORD** Win a special publication of your choice

ONLINE SPECIALS

- TIME FOR A RAINDANCE?** Hydrogeologist Steve Brown issues an early warning that the UK is already heading for drought in Olympic year

SPRING 2012 TRAINING COURSES

Risk Assessment for Contaminated Land

- Human Health Detailed Quantitative Risk Assessment*
7th to 8th March 2012
- An introduction to contaminated land risk assessment*
18th to 19th April 2012
- Applying the Environment Agency's remedial targets methodology*
25th April 2012
- Detailed quantitative risk assessment using RISC
20th June 2012

Groundwater Flow and Transport Modelling

- Practical training in FEFLOW
22nd and 23rd March 2012
- A Practical Introduction to Borehole Testing and Interpretation
2nd May 2012
- Practical groundwater flow and contaminant transport modelling*
15th to 17th May 2012

Discounts available for Local Authorities and group bookings from the same company. ESI also offers substantial associated software discounts to Course delegates.

Contact us for information on our Courses, Software or Consultancy
Courses@esinternational.com

ESI Ltd., Shrewsbury SY2 6FD
www.esinternational.com/training
Tel: +44 (0) 1743 276100

All Courses held at ESI offices in Shrewsbury, Shropshire.
* CPD training endorsed by the Geological Society



ESI is a leading independent scientific and environmental consultancy specialising in water resource management, land quality and ground source energy. Scientific, **technical training courses** are delivered based on ESI's expertise by our own consultants.

Geolsoc Job Listings

www.geolsoc.org.uk/joblistings



View the latest Earth science employment opportunities in industry and academia with the Geological Society's online job listings: www.geolsoc.org.uk/joblistings.

Recruiting? Register to use our free job posting service!

Email sara.anders@geolsoc.org.uk for further information.



The Geological Society
serving science & profession

Contact: Sara Anders
T: 020 7432 0945
E: sara.anders@geolsoc.org.uk
W: www.geolsoc.org.uk/joblistings

MRes Earth Sciences

Part-time, 2 years

At the Department of Earth and Planetary Sciences we offer courses covering all aspects of Earth Sciences.

Our part-time MRes/Postgraduate Diploma in Earth Sciences is ideal for students who want to undertake a limited amount of supervised research on a shorter timescale than for an MPhil or PhD. This type of Master's degree is rapidly becoming a prerequisite qualification for entry into the Earth Science professions, all of which contain a strong element of research work. As well as a range of laboratory and IT skills, the degree teaches practice in organising a research project and publishing its results. All formal teaching takes place in the evening at our central London location.

The first year includes formal teaching and the second year of study is dedicated to a research project under the supervision of a research active member of staff.

Applicants must have a good degree in Earth Sciences, Geology or related subject. Admission is biennial (2012, 2014 etc). Successful students can go on to study a PhD/MPhil in Earth Sciences.

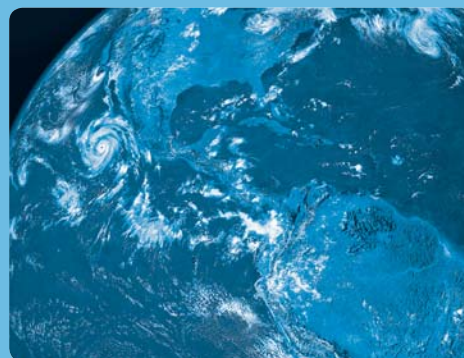
The Department is part of the highly rated UCL/Birkbeck Joint Research School in Earth Sciences, facilitating access to a wide range of research resources and expertise.



Birkbeck
UNIVERSITY OF LONDON

For more information please email: s.jenkins@bbk.ac.uk

To apply for one of our programmes please go to:
www.bbk.ac.uk/es/prospective



www.bbk.ac.uk/geology

020 3073 8032

London's evening university

“THE SEEDS OF ENI'S CHILDREN'S PROGRAMME, BRINGING EARTH SCIENCE TO SCHOOLS IN THE HIMALAYA, WERE SOWN IN BURLINGTON HOUSE”

Front cover image: Takayuki Hayato/
Shutterstock.com

Geoscientist is the Fellowship magazine of the Geological Society of London

The Geological Society,
Burlington House, Piccadilly,
London W1J 0BG
T +44 (0)20 7434 9944
F +44 (0)20 7439 8975
E enquiries@geolsoc.org.uk
(Not for Editorial)

Publishing House

The Geological Society
Publishing House, Unit 7,
Brassmill Enterprise Centre,
Brassmill Lane, Bath
BA1 3JN
T 01225 445046
F 01225 442836

Library

T +44 (0)20 7432 0999
F +44 (0)20 7439 3470
E library@geolsoc.org.uk

EDITOR-IN-CHIEF

Professor Tony Harris FGS

EDITOR

Dr Ted Nield NUJ FGS
E ted.nield@geolsoc.org.uk

EDITORIAL BOARD

Dr Sue Bowler FGS
Mr Steve Branch FGS
Dr Robin Cocks FGS
Dr Martin Degg FGS
Dr Joe McCall FGS
Dr Jonathan Turner FGS
Dr Jan Zalasiewicz FGS

Trustees of the Geological Society of London

Dr J P B Lovell OBE
(President); Professor P A Allen (Secretary, Science); Miss S Brough; Mr M Brown; Professor R A Butler; Mr D J Cragg; Professor J Francis; Professor A J Fraser; Dr S A Gibson; Mrs M P Henton (Secretary, Professional Matters); Dr R A Hughes; Dr A Law (Treasurer); Professor R J Lisle; Professor A R Lord (Secretary, Foreign & External Affairs); Mr P Maliphant (Vice president); Professor S B Marriott (Vice president); Professor S Monro OBE; Mr D T Shilston (President designate); Dr C P Summerhayes (Vice president); Professor J H Tellam; Dr J P Turner (Secretary, Publications); Professor D J Vaughan; Mr N R G Walton

Published on behalf of the Geological Society of London by

Century One Publishing
Alban Row, 27–31 Verulam
Road, St Albans, Herts,
AL3 4DG
T 01727 893 894

F 01727 893 895
E enquiries@centuryone
publishing.ltd.uk
W www.centuryone
publishing.ltd.uk

CHIEF EXECUTIVE

Nick Simpson

T 01727 893 894

E nick@centuryone
publishing.ltd.uk

ADVERTISING EXECUTIVE

Jonathan Knight

T 01727 739 193

E jonathan@centuryone
publishing.ltd.uk

ART EDITOR

Heena Gudka

DESIGN & PRODUCTION

Sarah Astington

PRINTED BY

Century One Publishing Ltd.

Copyright

The Geological Society of London is a Registered Charity, number 210161.

ISSN (print) 0961-5628
ISSN (online) 2045-1784

The Geological Society of London accepts no responsibility for the views expressed in any article in this publication. All views expressed, except where explicitly stated otherwise, represent those of the author, and not The Geological Society of London. All rights reserved. No paragraph of this publication may be reproduced, copied or transmitted save with written permission. Users registered with Copyright Clearance Center: the Journal is registered with CCC, 27 Congress Street, Salem, MA 01970, USA. 0961-5628/02/\$15.00. Every effort has been made to trace copyright holders of material in this publication. If any rights have been omitted, the publishers offer their apologies.

No responsibility is assumed by the Publisher for any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products, instructions or ideas contained in the material herein. Although all advertising material is expected to conform to ethical (medical) standards, inclusion in this publication does not constitute a guarantee or endorsement of the quality or value of such product or of the claims made by its manufacturer.

Subscriptions: All correspondence relating to non-member subscriptions should be addressed to the Journals Subscription Department, Geological Society Publishing House, Unit 7 Brassmill Enterprise Centre, Brassmill Lane, Bath, BA1 3JN, UK. Tel: 01225 445046. Fax: 01225 442836. Email: sales@geolsoc.org.uk. The subscription price for Volume 22, 2012 (11 issues) to institutions and non-members is £108 (UK) or £124 / US\$247 (Rest of World).

© 2012 The Geological Society of London

OF MAPS, MEANS AND ENDS

Sometimes the easiest thing to lose sight of is the objective. The real objective, I mean. Most geologists will have spent long, arduous days (now fondly remembered), suffering in the field and later in the lab, wrestling with mind-bending 3D puzzles. It is all too easy to fall victim to the beguiling attractions of techniques laboriously learned and slowly mastered, which then become such a pleasure to exercise that we may forget why we are actually doing them. Indeed, the means might eventually become the end. Too much effort has been expended mastering the technique for it to be easily – still less joyfully – relinquished.

Take fly fishing. It's less effective as a food-gathering technique than a stick of dynamite, but then the occasional grilled trout isn't the point. How we scorn any upstart technology that designs our hard-won skill out of the equation. Using some gimcrack gizmo to do what you once did with your brain and a pencil, doesn't seem like real education, somehow. We resent it.

For many geologists, the map is a quasi-sacred object, the foundation of all that we do; and learning how to make them, a mystic-awful process with overtones of the primitive tribal initiation rite. True, to some extent it has already been made easier. Never mind GPS, or satellite or aerial photos – look at those cheaters' crib-sheets – OS base-maps! Alexander Logie DuToit (1878-1948) mapped tens of thousands of square miles of South Africa singlehanded – including the entire Karoo System from Dwyka tillite to Drakensberg – *making his own base-maps as he went*. Now that's the real deal.

But the maps themselves – how we choose to present our data and read it off – is a technology invented by a certain William Smith 200 years ago. Maps may have come a little way since then, but basically it's still Smith's toolkit. Today there is, as Martin Smith and Andy Howard reveal in this issue, so much more we can do using new technology.

Maybe geologists will never quite abandon the paper map – maybe it will keep its status as a fetish object. Remember how people reacted to the *Kindle*. Ah, they said, what about the heft, the feel and smell of a book? But then they remember luggage surcharges, and soon, practical considerations have outweighed aesthetic ones until the new technology is sold.

And yet books will survive as coveted, top-end objects. We can have books *and* the Kindle. We can have maps *and* a 3D NGM.

Let's just remember why we're really here.

DR TED NIELD EDITOR



Save the bug pickers!

The world is facing a shortage of micropalaeontologists, a useful and oft-overlooked tribe of harmless drudges, and should do something about it, says **Alan Lord***

MICROPALAEONTOLOGY

Easy to overlook but hard to do without, beaver away unobtrusively on many a petroleum exploration and production borehole you will find a micropalaeontologist. On the basis of the foraminifera, coccoliths or palynomorphs observed in cutting samples, he or she advises the well-site geologist and driller on the stratigraphic level reached, where to set casing points, and so on.

This might appear to be 'mid-20th Century technology' but it remains relevant today, especially in the vital monitoring of directional drilling within reservoirs. And yet, in little over a decade, the UK has gone from being a net exporter of trained micropalaeontologist biostratigraphers to having to import them. The prospect of a looming global shortage makes even that option less viable in the medium term. A letter from Dr Haydon Bailey FGS in the January 2012 Petroleum Exploration Society of Great Britain (PESGB) *Newsletter* painted a gloomy picture of an aging skills pool, the 2008 closure of the last UK specialist Masters programme, and fewer youngsters being trained.

“IN LITTLE OVER A DECADE, THE UK HAS GONE FROM BEING A NET EXPORTER OF TRAINED MICROPALAEONTOLOGIST BIOSTRATIGRAPHERS TO HAVING TO IMPORT THEM

Alan Lord

NEW PROGRAMME

The Micropalaeontological Society (TMS) together with PESGB has therefore established an Educational Trust Fund to sponsor graduate students in micropalaeontology with a view to alleviating the problem and to seek industrial funding. The Geological Society strongly supports the initiative, and applauds the launch

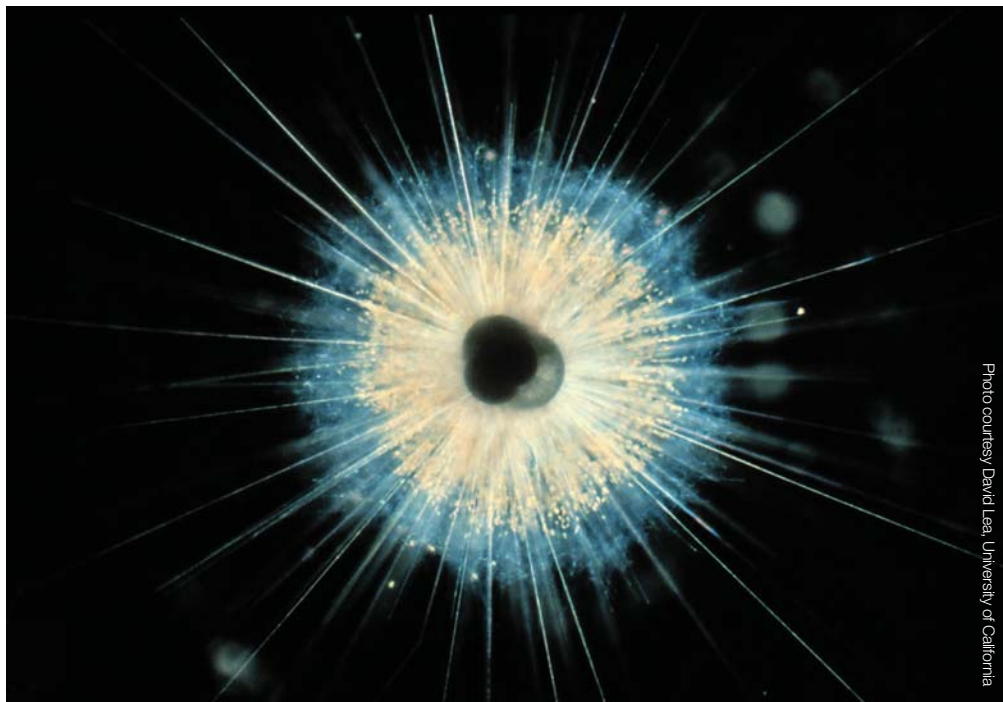


Photo courtesy David Lea, University of California

Above: Living planktic foram *Globigerinoides ruber*, one of the two most important spinose species in warm tropical surface waters

this year of a new Masters programme at the University of Birmingham.

In recent months GSL, working with CHUGD, BGS, BGA and PESGB, has made representations to government and executive agencies about existing and predicted skills shortages, and the potentially serious negative consequences for the UK economy if they go unaddressed (notwithstanding the reduced level of central funding provided to higher education in

general). The Society will continue to point out the contribution geoscience makes to the national economy, and to make the case for a degree of special treatment for certain 'significantly important and vulnerable subjects' such as micropalaeontology, geophysics and hydrogeology.

* **Professor Alan Lord** is Secretary, Foreign and External Affairs

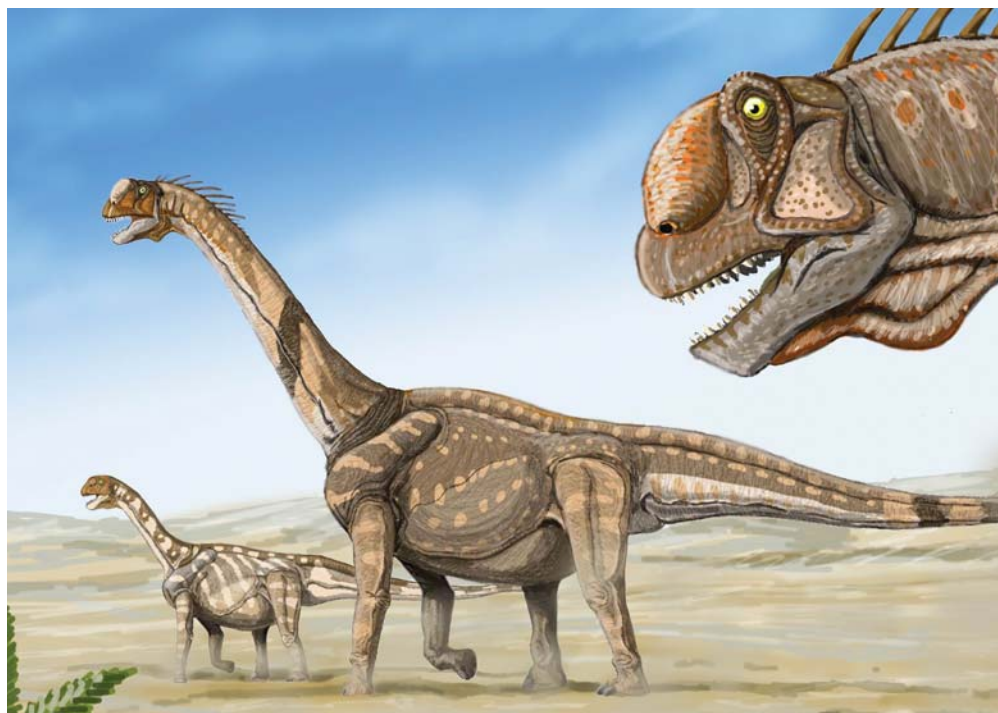


The Comette family of Paris, whose home was recently struck by a fragment of meteorite. What are the odds?

[FUNNY OLD WORLD]

Unconsidered trifles, by 'Snapper'

Monitor: Snapper. All contributions gratefully received. Please write to the Editor at Burlington House, or email ted.nield@geolsoc.org.uk marking your submission "snapper".



March of the sauropods

Migration habits of dinosaurs have been revealed for the first time, using the enamel from their teeth. **Sarah Day** reports

PALAEONTOLOGY

The migration habits of 150 million-year-old dinosaurs have been revealed for the first time, after scientists from Colorado College analysed their tooth enamel. The study, by Henry Fricke, Justin Henceroth and Marie Hoerner, were published in the December 2011 issue of *Nature*. The researchers hope their findings will help us to understand a 'paradox' – namely, how sauropod dinosaurs achieved their massive size, with the largest reaching a possible 58 metres in length, and weighing over 100 tons.

The team analysed enamel from the teeth of *Camarasaurus*, the most common of the giant sauropods found in North America during the late Jurassic (155 – 145 Ma). Collected at Thermopolis, Wyoming and Dinosaur National Monument, Utah, the teeth record the oxygen isotope ratios of the surface water reservoirs which served as the dinosaurs' water supply.

While the remains of the dinosaurs were found in the Morrison formation

of western North America – a sequence of late Jurassic sediments from a depositional basin – it is unlikely that the sauropods remained there year-round. Such floodplain settings were characterised by a seasonally dry climate, which would have left them struggling as drought set in. How massive herbivores managed to survive in large numbers under these conditions has long been a mystery, migration being one possible explanation. But until now, no direct evidence has supported the theory.

As well as dinosaur tooth enamel, oxygen isotope ratios are preserved in the carbonates formed in basin soils, lakes and wetlands. This allowed the scientists to compare the teeth with locations through which the dinosaurs may have travelled. Vertebrate teeth form in stages; so by taking samples from the base to the tip, a pattern can be established showing the difference in isotope ratios with time. Having established that the teeth of *Camarasaurus* took approximately four to five months to form, the scientists

Above: Life reconstruction of *Camarasaurus supremus* herd by Dmitry Bogdanov

“THEY WOULD HAVE LEFT THE BASIN DURING THE DRY SEASON WHEN PLANT GROWTH WAS LIMITED AND DROUGHT COMMON, AND RETURNED IN THE WET SEASON”

Henry Fricke

were able to build up a picture of their movements over this period.

The results suggest that they divided their time between the fluvial and wetland environments of the Morrison basin and another area, of high elevation. Reconstructions of the regional geology imply that the dinosaurs must have migrated approximately 300 km in each direction to reach such an area.

“Assuming *Camarasaurus* migrated to obtain the food and water they needed to survive” say the authors, “they would have left the basin during the dry season (presumably summer) when plant growth was limited and drought might have been common, and then returned in the wet season (presumably winter).”

All teeth showed similar patterns, suggesting migration took place in herds. While the results show the dinosaurs moving from a basin environment to a highland one, they do not record a return to the basin, which must have happened because that was where the teeth were found. The researchers explain this by invoking a ‘lag’ of approximately two weeks between the intake of oxygen and its expression in the body.

Researchers now plan further studies to establish whether herd migration was universal in sauropods, in the hope that the role of migration in the evolution of gigantism might be better understood.

REFERENCES

- 1 Henry C Fricke, Justin Henceroth & Marie E Hoerner Lowland-upland migration of sauropod dinosaurs during the Late Jurassic epoch, *Nature* Vol. 480 pp. 513 – 515

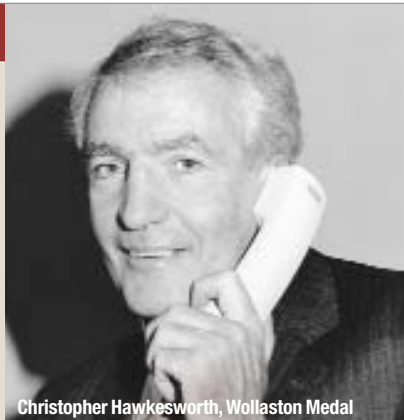


SOCIETY NEWS

ELECTION – FELLOWS

The following names are put forward for election to Fellowship at the OGM on 30 November 2011.

ARMSTRONG, Laura; AVEYARD, Beth Catherine; BAARS, Franciscus Jacobus; BAILEY, Christopher Peter; BAMFORTH, Selina Mary; BELL, Stuart; BELLAMY, Christopher Shawn; BEVAN, Andrew; BLADON, Andrew John; BONNE, Kathelijne; BRADY, Aoife; BROADGATE, Marianne Lesley; BRYAN, Luke Robert; BUGG, Christopher; CALVERT, Darren Edward; CARNABY, Oliver Kirk; CHAMBERLAIN, Thomas William; CHEN Huanjie; CHAPMAN, Steven James; CHIEMEKA, Chinenye Imohimi Matthias; CHIU, Ka Yi; CHONG, Lee Ming Peter; CHRISTIANSSON, Nils Peter Erling; CHUNG, Yuk Ling; CLARK, Allan; CLEMENCE, Joel David; CLEVERLEY, Paul Hugh; COLBOURNE, Ian Richard Trevor; COLLINS, Stephen; CONNORS, Karen Ann; COOK, Jonathan Peter Radford; COOKE, Jennifer Mary; COPLAND, Elizabeth; DALY, Robert; DARTNALL, Rosemary; DAVIES, John; DAVIS, Timothy John; DE JONG, Koenraad; DE LEEUW, Johannes Hendricus Wilhelms; DJKSTRA, Tom Ane; DORAI, Rishi Raj; DUCKETT, Jacqueline Alice; DUNBAR, Campbell; DUNSTAN, Simon Marcus; DYER, Martin Dennis; EBIE, Azuka C Edward; EKINCI, Abdullah; ELLIS, Jennifer; ERRINGTON, Paul Anthony; EVANS, Mark; EVETTS, Ian; FEIST, Sean Edward; FIELDING, Gavid Douglas; FROST, Brian Russel; FROUDE, Melanie; GARDINER, David Jack; GIBBONS, Simon; GIPSON, Mark James; GREENFIELD, Simon Francis; HAKHOO, Naveen; HALL, John Kendrick; HANSON, Jonathan Bruce; HAY, Michael William; HENSLEY, Claire; HERBERT, Jessie Ann; HUGALL, Jeremy Newton; INGEBRIGTSEN, Arild; JACK, Alice Geraldine; JARZEMBOWSKI, Edmund; JIMENEZ MADRID, Alberto; JOHNSON, Maya; KAYE, Joseph; KEAY, Adam Edward; KEENAN, Barbara; KELLY, Robin; KENT, Emiko Jane; KEUNG, Kwun Lun; KIBBEY, Thomas Darrell; LAKE, Oliver James; LANE, James Michael; LANGLANDS, John Gordon; LEE, Jen Deng; LEIGH, Gerwyn James; LEMON, Alexander Mark; LEUNG, Kwun Lun; LEWIS, Joanne Rae; LEWIS, Richard David; MACDONALD, Robert Alexander; MACGREGOR, Karen Louise; MAHAJAN, Ritesh; MARRIOTT, Scott Thomas; MARTIN MONGE, Antonio; MAZUREK, Martin; MCGREEVY, Jamie; MCINTYRE, Iain Andrew; MERRIMAN, David; MIDDLETON, Ian Richard; MILNER, Joseph; MINETT-SMITH, Samuel James; MOFFATT, Andrew David; MORGAN, Emily; MORRISON, Justin G S F; MORT, Nicola; MURDOCH, Ashley John; MURPHY, Eleanor; NDIP, Rita Oben; O'HALLORAN, Michael Andrew; OHORA, Simon William; OSTBY, Jan; OSWIN, John Robert; OVERALL, Ross; PAGE, Christopher Patrick; PEACOCK, Charlotte Robson; PEASE, Victoria Lynne; PERUMALA, Sunder Raju; POLANCO FERRER, Rosa; PULMAN, Alice; ANDREW, Quarles van Ufford; RAMSEY, Christopher Bronk; REES, Harri Owain; RIDING, Nicholas Luke; ROBERTS, Michael; ROBSON, Chris; RUSHTON, Gemma Louise; RUSSELL CLAMP, Kate Elizabeth; SAMUEL, Katherine; SANTANGELI, James Robert; SATOW, Christopher; SEVAST-JANOVA, Inga; SHEPHERD, Alan William; SIMPSON, Peter William; SINGH, Devendra Pal; SMART, Jeremy David Charles; SMITH, Christopher James Martin; SOMMACAL, Silvano; SPEIGHT, Christopher; SQUIRE, Barry; STAINFORTH, John Glover; STONE, Jonathan; SYKES, Karina; THATCHER, John Stefan; THOMAS, Stephen Leslie; THORN, Jessica Louise; URRENGOETXEA, Jon; WACH, Grant Douglas; WADE, Bridget; WAKE, Bradley; WANG, Dong Mei; WARING, Andrew James; WATKINS, Hannah Elizabeth; WELLER, Owen Michael; WHARTON, David Ian; WHITEHEAD, David; WILLIAMS, Francis Thornton; WILSON-SLIGHT, Andrew; WONG, C Jung; WONG, Po Fung; YATES, Robert Andrew; YEUNG, Wui Yin; ZIMMERMANN, Udo.



Christopher Hawkesworth, Wollaston Medal



Simon Winchester, Distinguished Service Award

Society Awards 2012

The Society is delighted to announce the names of the winners of its medals and funds and offers all its heartiest congratulations. Details of the President's Awards will be announced in a later issue.

► The Awards will be presented at **President's Day on 13 June 2012**

Name	Award
Christopher Hawkesworth	Wollaston Medal
Eric Wolff	Lyell Medal
Frank Spear	Murchison Medal
William Aspinall	William Smith Medal
Richard Aldridge	Coke Medal
Robin Strachan	Coke Medal
<i>Not awarded</i>	Aberconway Medal
Geoffrey Duller	Bigsby Medal
<i>Not awarded</i>	Prestwich Medal
Cherry Lewis	Sue Tyler Friedman Medal
David Ward	R H Worth Prize
Bridget Wade	Wollaston Fund
Jamie Pringle	William Smith Fund
Daniela Schmidt	Lyell Fund
Russell Wynn	Murchison Fund
Ian Jackson	Distinguished Service Award
Simon Winchester	Distinguished Service Award

Fellowship Renewal

Every year at this time we remind Fellows to renew their Fellowship for the current year, or face being struck off – and the subsequent inconvenience of having to re-apply. Each year, late payment means additional costs and administration for the Society. In the current climate, we need to ensure we make optimum use of resources, and we rely on your support to achieve this. Time is running out for you to renew. To ensure that you continue to support and belong to your professional body, please renew today – preferably online via the website. Otherwise, call Burlington House and ask for Fellowship. *EN*

FUTURE MEETINGS

Dates for meetings of Council and Ordinary General Meetings until June 2013 shall be as follows:

- 2012: 11 April, 27 June, 26 September, 28 November
- 2013: 6 February, 10 April.

[LECTURES]

Shell London Lecture Series



Sinking Deltas

Speaker – Professor James Syvitski

28 March

Deltas around the world are economic and environmental hot spots. They occupy 1% of the Earth's land area but are home to >500 million people living within five metres of sea level. Sinking deltas are associated with coastal flooding, wetland loss, shoreline retreat, and often loss of infrastructure. These magnify the risks associated natural perils affecting deltas (storm surges, hurricane winds and rain, river floods) because many deltas also concentrate people and values in megacities and have imperfect coastal protection.

Risk assessment of sinking deltas has been semi-quantitative at best - often we know that a delta is sinking many times faster than sea level is rising, but we do not fully understand all the reasons behind the faster sinking rate. New approaches and tools offer hope of a more quantitative assessment with known uncertainties.

■ **Programme** – Afternoon talk: 1430pm Tea & Coffee: 1500 Lecture begins: 1600 Event ends.

■ **Programme** – Evening talk: 1730 Tea & Coffee: 1800 Lecture begins: 1900 Reception.

FURTHER INFORMATION

Please visit www.geolsoc.org.uk/shelllondonlectures12. Entry to each lecture is by ticket only. To obtain a ticket please contact the Society around four weeks before the talk. Due to the popularity of this lecture series, tickets are allocated in a monthly ballot and cannot be guaranteed.

► Contact: **Naomi Newbold**, The Geological Society, Burlington House, Piccadilly, London W1J 0BG, T: +44 (0) 20 7432 0981 E: Naomi.newbold@geolsoc.org.uk

In association with



FROM THE LIBRARY

The library is open to visitors Monday-Friday 0930-1730.

For a list of new acquisitions click the appropriate link from <http://www.geolsoc.org.uk/gsl/info>

Vote! Vote! Vote!

Edmund Nickless, Executive

Secretary writes: Nominations for Council were published in February *Geoscientist*. If you haven't already cast your vote can I please encourage you to do so. The total number of Fellows voting in 2011 was 1055, from an electorate of around 10,000.

The candidates running for Council have committed to give a considerable amount of their time to serve the Society if elected. So please, give a very little of your time to vote. Without a reasonable turnout, it will be difficult to encourage people to stand in future.

SCAR's New Face

The Society has reached agreement with the Scientific Committee on Antarctic Research (SCAR) to publish Special Publications resulting from SCAR's Earth Science activities. SCAR will encourage programme leaders and meeting conveners to submit proposals for GSL Special Publications and in return will receive a fee for each volume published; the SCAR logo will be included on the cover of the volumes. This will enable both organizations to promote and encourage greater

understanding of, and education in, the Antarctic Earth sciences.

The first volumes to be included in this agreement result from the successful International Symposium on Antarctic Earth Sciences in Edinburgh this August.

We look forward to a long and fruitful co-operation between the two organisations.

► More information about SCAR can be found at: <http://www.scar.org>



Antarctic research to be published by the Society

WIKIPEDIA WORKSHOP

The Geological Society is working with Wikipedia to improve the quality of information it holds on 7500 articles on geology. Fellows are invited take part in this exciting new project by attending a workshop at the Geological Society to learn how to edit Wikipedia

► For further information and to express interest visit www.geolsoc.org.uk/wikipedia



SOCIETYNEWS...

Society Copyright

Angharad Hills writes: There have been some significant changes to the Society's policy for the re-use of published material. These changes will make it much easier for people wishing to use material from Society publications and also for the staff at the Publishing House.

From now on, authors may reuse their own material without permission, subject to certain exceptions. Anyone may use up to three items (text extracts, figures or tables) from GSL published material without permission

or charge, provided proper acknowledgement of source is given. If you require written permission or more than three items, there will be a charge (discount for Fellows).



Full details, including how to obtain permission, can be found at www.geolsoc.org.uk/permissions. Information sheets can also be picked up in the Society's Library, or requested from **E: Julie.webster@geolsoc.org.uk** **T: 01225 445046**

UKRoGEP Turns 50

The UK Register of Ground Engineering Professionals (UKRoGEP) appointed its 50th registrant in December following its launch in June. The rapidly expanding register will enable clients and other professionals to identify those ground engineering practitioners who are likely to bring the greatest value to their projects. Registration will demonstrate an *individual's technical competence, professional attitude and experience*. To learn more about UKRoGEP see the

article by Vice President Paul Maliphant in the August issue of *Geoscientist*. Full details of the scheme, copies of all application forms, details of fees and the Register itself can be found at www.ukrogep.org.uk. Fellows who have achieved Chartership in a ground engineering specialism within the last year can take advantage of a discounted application fee normally only applicable to applications made at the same time as their chartership application!

In Distrain of Trade

Paul Maliphant writes: Recently a job advert was identified that appeared to exclude Chartered Geologist from the eligibility criteria for appointments where such expertise was, in our view, essential. This case is being addressed

with vigour. However, if you notice any other examples appearing to be in distrain of the trade of chartered fellows, please bring the matter to the attention of the Professional Secretary or the Chair of the Chartership Committee.

[MEETINGS]

Frontier Spirit – Stimulating Debate



Mark Allen, Philip Allen, Adrian Hartley, Niels Hovius, Chris Jackson, Woody Wilson report on the successful first outing for the new 'Frontiers' meeting format

On 14 November 2011, the Geological Society hosted a one-day conference on *'The Coupling of Tectonics and Surface Processes'* - first in the Society's new 'Frontiers' format where registration is free: the idea being to stimulate debate and research around a rapidly developing theme.

This conference theme was originally conceived by Philip Allen, Chair of Science Committee. The aim was to bring together scientists from as many fields as possible, to discuss how tectonics and surface processes interact. It was timely: it is now widely recognised that there are feedbacks between tectonics and surface processes across a range of time- and length-scales. Such feedbacks have long been under-appreciated, perhaps because the subjects have tended to be taught and researched in isolation.

The day drew over 100 people to a program of 17 varied talks, from specific regional case-studies integrating structural geology and geomorphology, to attempts to understand the coupling of mantle dynamics and landscape evolution on a global scale. A key feature of the day was the construction of a "living slide", whereby each speaker suggested a topic or question that they believed merited more research. This slide formed the focus for a lively discussion at the end of the day.

One thing was clear: major leaps in understanding are encouraged by diverse approaches. The more multidisciplinary we can make such meetings, the better. Our thanks go to Georgina Worrall and the Conference Office.

THE GEOLOGICAL SOCIETY CLUB

The Geological Society Club, successor to the body that gave birth to the Society in 1807, meets monthly (except over the field season!) at 18.30 for 19.00 in the Athenaeum Club, Pall Mall. Once a year there is also a special dinner at Burlington House. New diners are always welcome, especially from among younger Fellows. Dinner costs £52 for a four-course meal, including coffee and port. (The Founders' Dinner, in

November, has its own price structure.) There is a cash bar for the purchase of aperitifs and wine.

2012 28 March; 11 April (Burlington House); 23 May.

Any Fellow of the Society wishing to dine should contact **Dr Andy Fleet**, Secretary to the Geological Society Dining Club, Department of Mineralogy, The Natural History Museum, Cromwell Road, London SW7 5BD. Email: a.fleet@nhm.ac.uk DR

Tell me a story

BY IAIN STEWART

Iain Stewart* thinks the answer to raising the geosciences' public profile is to exploit the narrative essence of historical science



The party is going nicely. Then an innocent asks: "So what do you do?" The reply induces mild panic. "Geologist - ah yes - family trees and stuff?". Most geologists have stories like this, which remind them just how peripheral their science appears to be in most people's lives. Yet such lack of familiarity ought to come as no surprise. 'Most people' last visited science in school, decades ago, when along with some physics, chemistry and biology they may have enjoyed glimpses of plate tectonics (or endured the rock cycle) in geography classes. Even if they did geology at university, they would find it hard to recognise modern Earth system science - a holistic fusion of scientific inquiries targeted at a dynamic planet whose history is not simply ongoing, but evolving at a quickening pace. As environmental thinker Thomas Berry notes: 'The planet that ruled itself directly over these past millennia is now determining its future largely through human decision...'. Never has geoscience been more critical to people's lives.

But do 'most people' know that? Probably not. The brave new world of Earth science is a bewildering place. Familiar rocks and fossils have been augmented by isotope excursion curves and seismic tomography to reveal how our planet works.

Such intricacies may make for hard going at informal social

gatherings; yet for me, despite the complexity, modern Earth science is ripe for public consumption. Ironically, this ripeness stems less from 'pressing social relevance' than from an inherent sense of narrative.

TELEVISION

In mass popular culture (television!), the flourishing areas of science are not the reductionist, experimental ones but the 'historical sciences' - cosmology, geology, palaeontology and archaeology. For at the heart of all these lies a compelling narrative of Homeric proportions. Geology's backdrop remains one of epic tales of lost worlds and clashing continents stretching across unfathomable time. And centre stage is the revelation that society itself is now a formidable geological force capable of imposing change at a planetary scale. Humans are now part of the geological story.

The lesson from 'the box' is that to get our message across, we geoscientists need to gift wrap it in *wonder*. The vital importance of metals is interesting, but the fact that most of the world's iron originated in a burst of oxygenation two and a half billion years ago is *fascinating*. The importance of coal is interesting; but that Carboniferous rocks reveal a world with an oxygen-rich atmosphere that fuelled giant insects and global fires is *captivating*. Triassic salt mines are *interesting* when icy roads need gritting, but *entrancing* when seen as relics of a time when shallow seas dried across a parched supercontinent. Dull gravel pits become *amazing* as the melted remnants of once kilometre-thick ice sheets.

The industrial geology that employs so many geoscientists and underpins our economy may seem boring, but we must not forget that we do not mine rocks. We mine the planet's past, replete with magic, wonder and awe.

* Prof. Iain Stewart (University of Plymouth) presented his latest TV series *How to Grow a Planet* on BBC2 in February

SOAPBOX

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

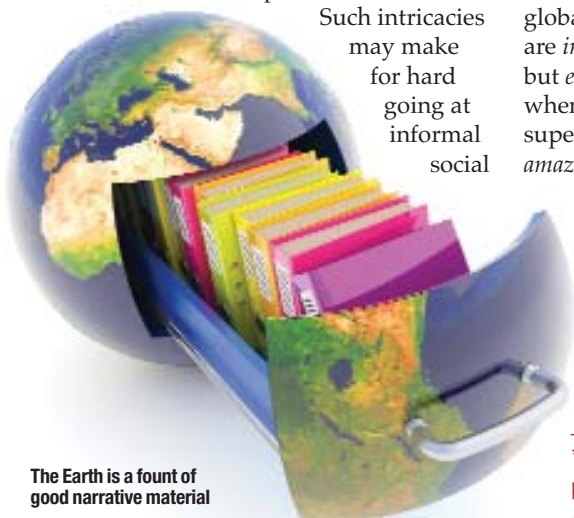
If you can write it entertainingly in **500 words**, the Editor would like to hear from you.

Email your piece, and a self-portrait, to ted.nield@geolsoc.org.uk. Copy can only be accepted electronically. No diagrams, tables or other illustrations please.

Pictures should be of print quality - as a rule of thumb, anything over a few hundred kilobytes should do.

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).

“NEVER HAS GEOSCIENCE BEEN MORE CRITICAL TO PEOPLE'S LIVES. BUT DO 'MOST PEOPLE' KNOW THAT? PROBABLY NOT. THE BRAVE NEW WORLD OF EARTH SCIENCE IS A BEWILDERING PLACE”
Iain Stewart



The Earth is a fount of good narrative material

The oil and gas industry has received a great deal of bad publicity in recent years. But the reality is that our world depends on fossil fuels for energy and will continue to do so for the foreseeable future - albeit with an increasing contribution from 'cleaner' and 'renewable' resources. It is clear that the world's growing energy demand will require us to find and develop new fossil fuel resources, including oil and gas, and improve our overall energy efficiency. In short, find more, waste less!

With this in mind, the Exploration and Production Division of Italian energy company eni has established a novel education programme to educate future consumers about the science and technology involved in finding and developing oil and gas resources, with a view to fostering awareness of energy use and conservation. Eni supports many social and educational causes in countries and communities where it operates; but this particular programme is unusual. It has brought together a dedicated (even 'driven') group of industry and academic geoscientists to deliver a shared dream: to inspire young children, and a new generation of geoscientists, to help deliver a better and more efficient energy future for both developed and developing worlds.

We believe it should be part of every petroleum geoscientist's duty to educate and inspire children, both about the science and technology that underpins today's oil and gas industry, and the likely implications of continued excessive and inefficient use of fossil

fuels. We must enthuse the next generation of industry geoscientists and help the industry to regain the respect it truly deserves. If we fail in this, we do an immense disservice to the oil and gas industry, humanity and our planet.

CHILDREN'S PROGRAMME

The seeds of the Children's Programme were sown in Burlington House - at precisely 11.00, 29 November 2006, during a coffee break at the a conference on 'Global Neoproterozoic Petroleum Systems - the emerging potential in North Africa' (Special Publication 326), organised by the Mahgreb Petroleum Research Group at University College London (UCL). This non-profit alliance delivers state-of-the-art geoscience research and training for energy and hydrocarbon exploration and development in North Africa, Middle East and Indian subcontinent. It has alliances with universities and academic institutes around the world, is funded by industry, and governed by a Scientific Advisory Board.

One attendee - Professor Bhat of the University of Jammu (India) - was invited to organise a follow-up conference in Jammu, and so it was there in early 2008 that the journey of the Children's Programme truly began as Eni - with the University of Jammu and UCL - sponsored the first 'Children's Education Programme and Energy Efficiency Campaign'.

The programmes are now international, but began in India. To date, the programme has been presented seven times in urban and rural India; in Jammu, Srinagar, Kargil and ►

THE ROAD TO SHANGRI-LA

Jonathan Craig* and friends tell us how an oil company is helping teach Earth science to children in the High Himalaya





Aerial Photograph of the Himalaya/Karakoram to the northwest of Leh (Ladakh) with the Crystalline Himalaya (snow capped mountains in the distance on the left), the Karakoram (snow capped mountains in the distance on the right), the Indus-Tsangpo-Suture Zone on the left, the Indus sedimentary sequence (ophiolites, turbidites, molasse, Cretaceous to Oligocene), the Indus Valley on the right and the Ladakh Batholith beyond

► Lehigh in Jammu & Kashmir State (Himalayas and foothills), in Jodhpur and Jaisalmer in Rajasthan State (Thar Desert) and in Hazaribagh in Jharkhand State (Gondwana Basin). Each area presents a different energy scenario and cultural mix, though they are comparable in terms of energy challenges.

Twice a year for the last three years the Children's Programme has been conducted for 100 to 150 secondary school children and their teachers in Northern India. The programme consists of lectures and practical workshops in petroleum geology, oil & gas exploration, production technology, global warming and energy efficiency. They are always wonderful days full of youthful excitement, enthusiasm and hope for the future.

The children, aged between 14 and 16, are chosen by their schools and drawn from all schools in their area. One teacher accompanies from each school. Most children come from very remote and sometimes high-altitude regions, and often spend days travelling on poorly maintained tracks. The excitement of the programmes, spending time in the regional capital and mingling with 'exotic' people seems to outweigh all their difficulties. Many of the children have never even had the opportunity to visit their local 'big town'. Such is their enthusiasm that one group of girls travelled by bus for two days, while another batch showed up after walking for hours after snow blocked the road.

OUTLINE

The children are given a broad outline of petroleum systems and how hydrocarbons are generated and trapped, evidence for past climate change in the geological record, and the impact on climate of the overuse of fossil fuels.

A common perception among many children is that oil is found in subterranean lakes. We demonstrate the reality using simple practical demonstrations such as squeezing a saturated bath sponge to show the importance of porosity and permeability. We bounce tennis balls off different geologic materials from different heights and record variations in travel times to show how seismic waves are reflected from different rocks. 'Hands-on' exercises include examining local rock types, minerals and fossils (to demonstrate geologic time) and different types of crude – from light to thick and tarry.

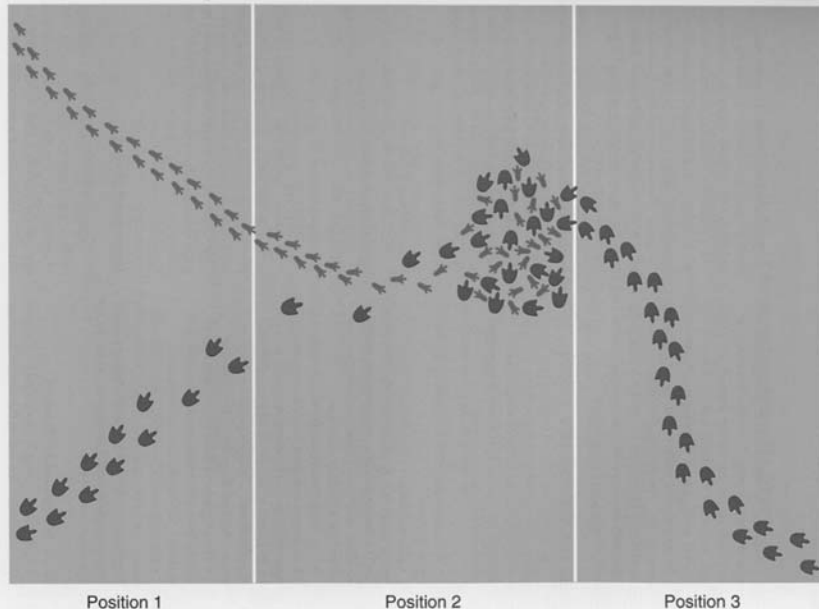
Leh (Ladakh) with the Zaskar Mountain range in the background, Indus Valley in the middle ground and in the foreground the old town built on granite of the Ladakh Batholith Inset: map for orientation



Demonstration of geological materials (Leh, Ladakh)



Identifying mineral samples and testing hardness (Jaisalmer, Rajasthan)



Dinosaurs footprints puzzle: Footprints of two dinosaurs approaching and meeting each other (AGI/AAPG Visiting Geoscientists – an educational outreach guide for geoscience professionals)



Crossing the Indus-Tsangpo-Zone the suture between the Indian and Asian continental plates. In the suture zone one can observe, apart from ophiolites, deep and shallow water sediments (mainly Jurassic and Cretaceous) scraped off the northern Indian Margin and "old volcanoes with sedimentary cover" which got stuck during subduction



Juergen Thurow on the Khardung La Pass – the disputed highest motorable road in the world connecting the Indus Valley with the Shyok Valley in the Karakorum

The children's unanimously chosen 'coolest' exercise uses the footprints of two dinosaurs approaching and meeting each other; only the larger footprints exit! The students are always astonished by the vast amount of geological information that can be gained from this specimen - and that the obvious explanation is not the only possible solution to this puzzle.

Each student is given a booklet on petroleum geology and the Energy Efficiency Campaign, a CD of the presentation 'Petroleum Geology & Exploration, Climate Change and Energy Efficiency', a DVD 'Why Earth Science?' (donated by the American Geological Institute); as well as T-shirts, calendars, writing pads, pen, pencil, eraser, sharpener and workshop files. The children are always very happy to take home their 'goody bags', prizes and certificates. The CDs, in particular, are very popular, enabling the children to share their experiences and learning with their friends at home.

TRAUMATISED

We have been privileged to work in intensely beautiful, but sadly traumatised region of Kashmir in Northern India (Ladakh and Jammu are mostly unaffected by the longstanding troubles) with a group of highly motivated geologists engaged in educating and inspiring the next generation of young geoscientists and engineers who must find and develop the energy resources needed to sustain India's rapidly expanding economy. The eni Children's Education Programme has now become the driving force behind this quest.

In July 2008 we travelled from Kashmir to Ladakh in the Transhimalayas (a remote area with strong cultural and ethnic affinities to Tibet and a favourite destination for adventure and cultural tourists, both Indian and overseas) and took the winding road over the high passes to present first in Kargil and then in Leh – both again sponsored by eni India.

Here we first introduced a prize poster competition. The children eagerly took on the challenge, and the exceptionally high standard of their posters, produced with very limited funds and often in extremely remote locations was astounding. What we recall most is that children in Jammu & Kashmir know all about climate change – they see it happening all around them. And, believe us: they really care. ►

► INDUS SUTURE

One of the privileges of working on the Programme is the opportunity to reach remote areas of outstanding beauty and spectacular geology including the Indus suture zone. Here are found the spectacular relicts of the collision of the Asian and Indian plates – complete ophiolite sequences scraped off the subsiding oceanic crust of the palaeo-Indian plate (now completely subducted), with shallow water rocks re-deposited in deep marine environments and the kilometre-thick Tertiary molasse sequences. Other spectacular geological features include the picture-book outcrops of almost complete Phanerozoic stratigraphy in the Zaskar Gorge and the U-bearing Ladakh and Karakorum batholiths with accompanying hot springs.

The Indus and Shyok rivers, which outline the Indus and Karakorum suture zones, flow through this high-altitude desert in the rain shadow of the High Himalayas. The landscape is dissected by meltwater streams, displaying spectacular alluvial fans and landslides. Monasteries nestle precariously on hilltops and cliff faces. Bactrian camels – their ancestors stranded here after this branch of the ancient Silk Route was cut off by political events – are a common sight. During the campaign in Leh (Ladakh) we did not, alas, discover Shangri-La; but we did find a high degree of environmental awareness and concern among the children, which is perhaps even better. They recounted stories of melting glaciers, industrial soot on the snow, the conservation of the limited energy supplies in their homes, and the pollution spread by emissions from oil tankers and tourist buses. Jammu & Kashmir State (and Ladakh in particular) makes a good case to demonstrate and hopefully address the development challenges posed by the lack of energy resources, a hostile and climatically sensitive environment, rapid population growth, and the relatively large number of summer tourists (an ever-increasing number from India itself).

Ladakh is very important strategically, with a strong military presence. The region has no fossil fuels and although hydro-electric power resources seem the obvious solution, in practice there are significant problems due to freezing in winter and silting in summer. The climate is dry and cold (minimum winter temperature -40°C). Much of the region is $>3500\text{m}$ above sea level and there is

generally very little vegetation. The capital, Leh, has a population of 65,000 and another 52,000 inhabitants live in 112 villages and hamlets. Leh is the headquarters for both the local civil administration and the military and paramilitary forces, and also receives some 65,000 visitors each year.

Leh's projected power demand in 2012 is 94 MW/hour. In June 2009, the installed generation capacity (for Leh and surrounding rural areas) was 13.5 MW, consisting of 8 MW from hydro- and micro-hydro projects and 5.7 MW from diesel generators. Unfortunately, when power demands are at a maximum in winter, hydropower stations shut down, and so the main source of electricity becomes diesel generators, expensive to run and significant atmospheric polluters. The projected Alchi hydro-electric plant is expected to have a capacity of 45 MW; but it is likely to run at only 25-30% efficiency during the winter. The present power requirement of the military for the entire Ladakh region is about 50 MW, of which some 25 MW is currently available through diesel generators and mini/micro hydro-electric plants.

Solar photovoltaic power generation – solar home lighting systems and solar lanterns – is used in some rural areas of Ladakh and this could be developed further. However, many such systems function for less than two years after the warranty period due to problems of extreme temperature variation, servicing and maintenance, and the current low success rate of photovoltaic systems in general. Geothermal resources (see references) and wind energy, although present, are not developed, but should be seriously considered – though they must be developed carefully in order not to damage the largely pristine and extremely sensitive high altitude desert environment.

GLOBAL DEMAND

Global energy demand is predicted to increase 40-60% by 2030. India is already the fifth-largest energy-consuming nation in the world and by 2030 it is estimated that primary energy demand in India will increase fourfold. Where is all this extra energy going to come from? And who is going to find it? Exploration for hydrocarbons in the northern part of India has not been particularly successful so far. Indeed, a big effort in locating hydrocarbon resources in Jammu and Kashmir State has never been made, despite the presence of significant discoveries in the Potwar Basin in

Sunset over the Ladakh Batholith

Influential support is always welcomed. Members of the team (Bindra Thusu, Alan Smith, Ghulam Bhat, Jonathan Craig from left) meet the Indian Prime Minister Manmohan Singh and present him with a set of educational material for the programme and discuss the importance of the energy efficiency campaign for Children in India

Lamayuru – one of the many spectacularly placed lamaistic monasteries in Ladakh – build on fluvial-lacustrine sediments near the Indus Valley



Right: Cover face of the booklet for the first programme event outside India – held in 2010 in Accra, Ghana

Pakistan just across the border from Jammu and the presence of biogenic gas in the Plio-Pleistocene sediment that underlie the Kashmir Valley.

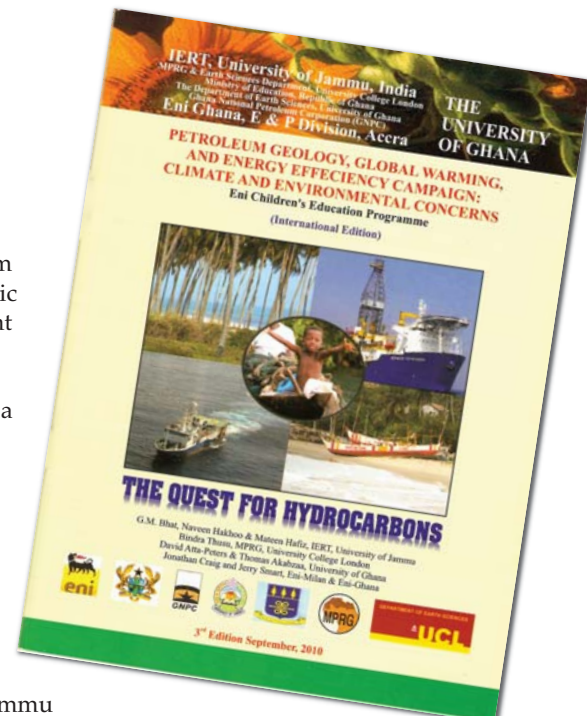
To address the growing energy deficit in Jammu & Kashmir State, a dedicated Institute for Energy Research and Training (IERT) has now been established at the University of Jammu, with the objective of developing a new centre of excellence for energy-related research. This was established in 2010, in collaboration with the Vice – Chancellors of the University of Jammu and the University of Kashmir and Ministers of the J&K State government, and we are proud to say that it was achieved at the suggestion and by the perseverance of the industry and academic geoscientists who run the Children's Programme.

The collaborative energy research at IERT is already supported by a several international institutes and organisations, including University College London, the Durham Energy Institute (University of Durham) and the Energy and Geoscience Institute (EGI, University of Utah). Academic staff from these universities also serves on the Advisory Board of IERT.

AWARD

In 2010 the eni Children's Programme attracted the prestigious Getenergy Award for excellence. The initial 'Jammu Conference' and the first eni Children's Education Programme received the patronage of the Prime Minister of India, Dr Manmohan Singh - largely through the efforts of Professor Alan Smith (University of Cambridge), who was a contemporary of Dr Singh at St John's College. Meanwhile, the Programme has grown beyond the subcontinent; in 2010 its first event was held in Accra (Ghana) where eni is actively exploring for offshore oil and gas. A second event was held there in December 2011, and will be followed by others elsewhere in Africa this year and in other parts of the world in years ahead.

The Geological Society itself, of course, already has a comprehensive and very successful programme of public outreach on the broader issues of geoscience but, working with the Petroleum Group of the Geological Society we believe that initiatives like the eni Children's Education Programme can help to fill a niche and bring a stronger 'petroleum and energy focus' to the



Society's outreach work.

As part of the Petroleum Group's 30th Anniversary celebrations, we are now in the process of developing links with our colleagues in PESGB, AAPG (K-12 Programme) and Earth Sciences Week (ESW) organised by the American Geological Institute (AGI) to develop new public outreach activities. Our intention is to focus, in particular, on secondary level students in schools and colleges, with the objective of educating and perhaps inspiring these young people to take up geoscience (or, at least, science!) as a career. ■

* **CO-AUTHORS:** Jonathan Craig jonathan.craig@eni.com, eni Exploration and Production Division, Milan, Italy; Juergen Thurow, Bindra Thusu and Heather Cheshire Maghreb Petroleum Research Group (MPRG), Dept. Earth Sciences, University College London, London, UK; Ghulam Bhat, Naveen Hakhoo, Sumita Koul, Sandeep Pandita, Vinay Sharma and Yudhbir Singh Institute of Energy Research and Training (IERT), University of Jammu, J&K, India

REFERENCES

- Bhat, G, Craig, J, Thurow, J, Thusu, B and Cozzi, A, Geology and Hydrocarbon Potential of Neoproterozoic - Cambrian basins in Asia' Geological Society of London, Special Publication (2012) (in press)
- Craig, J, Absar, A, Bhat, G, Cadel, G, Kashkari, R, Moore, J, Thurow, J and Thusu, B (in press) Hot springs and the geothermal potential of Jammu & Kashmir State, N W Himalaya, India Himalayan Geology Bull
- Craig, J, Thurow, J, Thusu, B, Whitham, A and Abutarruma, Y (eds) 2009 Global Neoproterozoic Petroleum Systems: The emerging Potential in North Africa Geological Society of London, Special Publication, 326
- Visiting Geoscientists – an educational outreach guide for geoscience professionals AGI and AAPG (www.agiweb.org/education/aapg/AAPG-Handbook.pdf)

October 22nd-23rd, 2012

Appreciating Physical Landscapes: Geotourism 1670–1970

The Geological Society, London

Geotourism's burgeoning literature has tended to focus on descriptions and case studies of modern interpretative and promotional provision in protected areas and geoparks. The significant historical antecedents of modern geotourism in Britain and Europe are comparatively neglected in the literature. Whilst these antecedents can be traced back to the elite 17th century travellers who ventured into wild landscapes and visited caves and mines, early modern geotourism, with many of the features of its present-day provision, can be recognised if not so named from the opening of the 19th century. This latter period more than coincided with the emergence of modern scientific geology and the beginnings of excursion tourism; the organised publication of regional geology guide-books and geology field excursions followed from the first quarter of the nineteenth century. The conference's timeframe opens with the early reportage of elite travellers and the publication of the first travellers' guide-books and closes at the cusp of modern landscape and geoconservation measures, such as national parks, areas of outstanding natural beauty, national nature reserves, and the emergence of environmental interpretation and modern countryside leisure as forerunners to modern geopark provision.



*Lithograph of Käse-grottee at Bad Bertrich
from Dr. August Goldfuss' Naturhistorischer Atlas, 1826*

Call for papers

Title, abstract (up to 500 words) and an associated image to be submitted by 30th April 2012. Please forward abstracts to Tom Hose:

gltah@bristol.ac.uk

For further information about the conference, please contact:

Conference Office, The Geological Society,
Burlington House, Piccadilly,
London W1J 0BG

T: 020 7434 9944 F: 020 7494 0579

E: registrations@geolsoc.org.uk

W: www.geolsoc.org.uk/geotourism12

Conference Organiser:

Tom Hose, *University of Bristol, UK*

THE END OF THE MAP?

Martin Smith and Andy Howard* explain why moving to a digital 3D National Geological Model is a 'coming of age' for William Smith's great vision

Most countries have a 'Geological Survey'. Though their roles vary considerably, they share a common purpose - to deliver geoscience knowledge that supports socioeconomic development, underpins research and provides authoritative, objective advice. The geological map has long been the main product that captures and communicates this geological knowledge; but this is now changing fundamentally in response to changing needs and new technologies.

Globally, in response to concerns (such as: living with natural hazards, environmental change, and security and sustainability of natural resources) many surveys are re-thinking their priorities for science and information delivery. In terms of geological mapping, for example, in 1996 the survey of the

Above: New techniques don't have to threaten all the pleasures of fieldwork (Whiteside, above Gasgale Craggs, Lake District, England)

Netherlands was 'completed', and the Dutch Survey (TNO) moved to constructing a national 3D geological model. Similarly, with the completion in 2011 of its 1:50,000 survey programme the French survey (BRGM) has moved to 3D representation, with the development of the Geological Reference System for France.

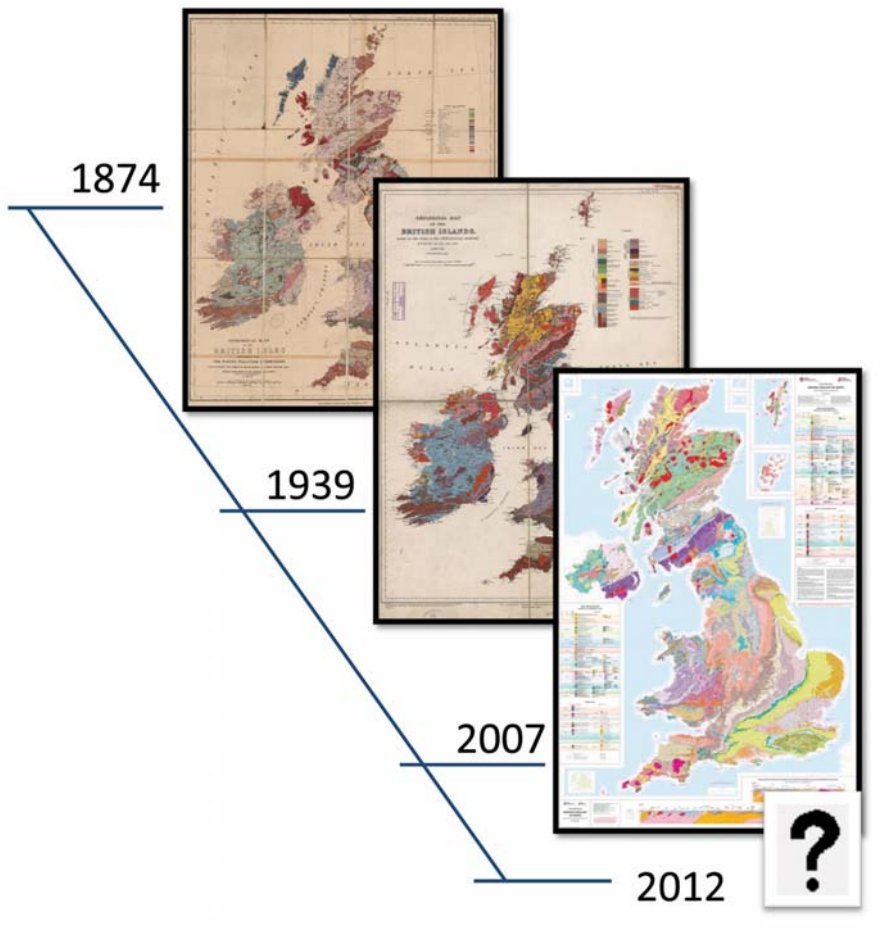
So what is happening at the British Geological Survey (BGS)? For more than a decade BGS has been preparing for a step-change. In 2012, it will wind up its systematic, map-based geological surveys of Great Britain and the production of lithoprinted geological map series, and move to a responsive programme with digital outputs. So - is this the end of the geological map as we know it? What will replace it?

NEW DIMENSION

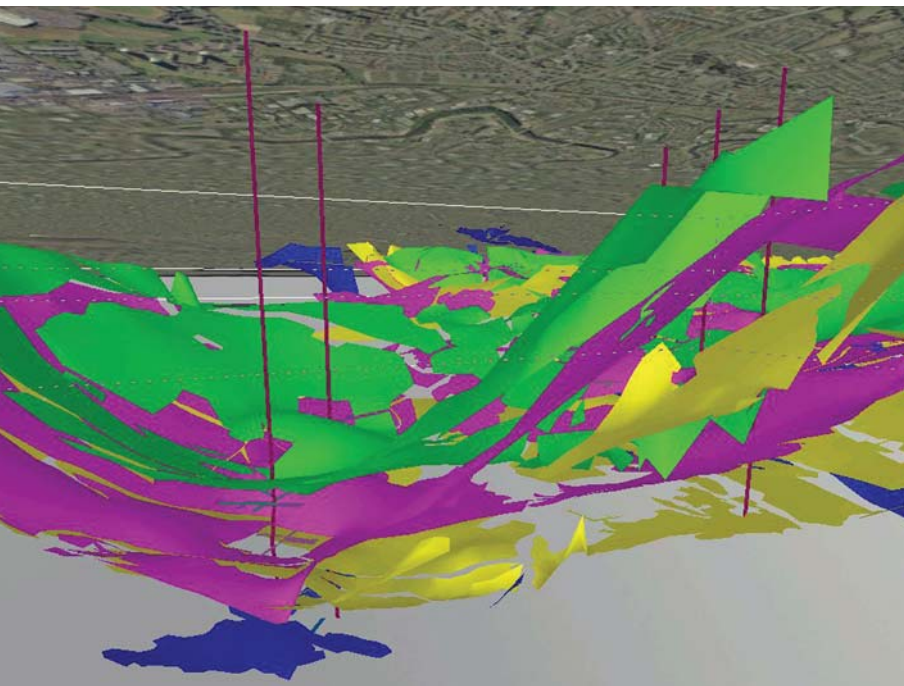
Early geological maps of the UK, from William Smith onwards, were

a response to economic need (coal, water, ores, building materials, transport infrastructure) to sustain the Industrial Revolution and military campaigns. However, like all good field geologists, William Smith had a well developed three-dimensional geological model in his mind. His 1815 map and cross-section represents the first national 3D geological model, communicated using best available technology - the printing press. For nearly two centuries the printed map and its derivatives have remained the signature output of the UK's core geological survey knowledge-base.

But in today's rapidly changing i- and e-world, geospatial applications, GPS and the Internet have made mapping on almost any imaginable theme instantly accessible online. The recently released iGeology smartphone app¹ has put an entire UK map ►



Stages in the evolution of the UK geological map



Subsurface Glasgow showing main coal seams and shafts extending down below East Glasgow



Major infrastructure projects are set to benefit from the 3D NGM

► library's worth of BGS digital maps into the pockets of the public. While this dataset is still communicated in 2D, software for modelling the form, properties and processes of the subsurface in three-dimensions is now available, affordable and used increasingly for geoscience applications, research and education.

This digital revolution also coincides with the present government's intention to invest significantly in transport, energy and communications infrastructure. *National Infrastructure Plan 2011*² highlights several ambitious projects, including the recently approved 'HS2' high-speed rail link, which will all demand the best available data and visualisation of landscape and subsurface to aid design and construction, together with process models to forecast impacts from these developments on critical resources like groundwater, and vulnerable environments, like wetlands.

FUTURE PRIORITIES

Going digital releases us from the limitations of sheet-based mapping, allowing us to integrate data and interpretations acquired from a variety of projects that are more tailored to user priorities, including:

- Large, multi-disciplinary geoscience survey and modelling projects in conurbations and their catchments (e.g. Glasgow/Clyde and London/Thames projects, currently ongoing), focusing on the Quaternary, Anthropocene and shallow bedrock geology
- Responsive geological surveys that develop new partnerships with end-users and address needs of major infrastructure and energy projects including HS2, new-build power stations, major regeneration schemes and the energy and water grids
- New, field-based investigations aimed at quantifying and modelling the physical and engineering properties of superficial deposits and rocks at sample, outcrop and basin resolutions, focusing on discontinuities, fabric and weathering and using new techniques in terrestrial LIDAR, shallow geophysics and remote sensing.

These surveys and observations will be embedded into a new, overarching 3D National Geological Model (NGM) of the UK. For the first time, this will provide us with the means to build and maintain a consistent, spatial knowledge base of the UK subsurface that is scale-independent and can be updated responsively as new data become available.

NATIONAL MODEL

So, what will this NGM look like? At regional to national scale it will be a seamless model that provides a geologically consistent framework for the Bedrock, Quaternary and Anthropocene deposits. In turn, this will host a range of other models of more varied content and scale: i.e., local and site-specific, much as the current 1:625,000 geological map embodies the 1:50,000 geological data. The models will use the same geological classification as the traditional geological map but will capture much more comprehensively the 3D understanding and interpretation of the survey geologist. The digital geological map, in various forms, will continue to be a key output of the NGM.

Models will not simply be used for visualisation but be queried as 3D information systems, using virtual boreholes, excavations and cross-sections to assist with subsurface problem-solving. As well as being successors to the geological map, these models will be capable of attribution with measured and interpolated physical, chemical and engineering properties. They will provide the medium for modelling the impacts of human use of subsurface space and resources, and will be ready to take their place within more ambitious models of the Earth System to help forecast and address the challenges of societal and environmental change. No doubt the technology of these 3D models would astound the early surveyors; but they would be very familiar to them in terms of 3D understanding.

We expect to release the first version of the bedrock national geological model this year, at a

comparable resolution to the current 1:625,000 scale national geological map. Our aspiration is to store and deliver our best interpretation everywhere, though this will vary considerably in content and resolution across Great Britain, especially in the immediate future as existing digital maps and models are merged into the NGM.

In essence, the pace of technological change and evolving demand means that there will no longer be a single, 'iconic' output from the model like the printed geological map. Instead, models can be continuously updated and manipulated to display the geology from the users' perspective and reflect currently available data. As new tools and technologies for querying, analysing and sharing the data become available, the outputs and use of the models will transform in ways we cannot foresee.

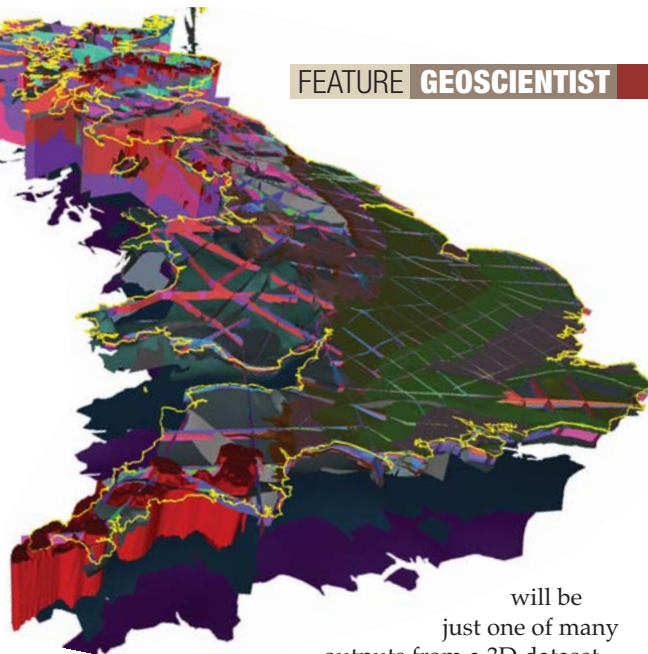
FUSION

If we want our geological data to make a difference, and contribute to integrated Earth System models, we face a major challenge in how to share and fuse our spatially referenced information and knowledge with, for example, those of other mapping agencies, research institutions and regulatory bodies. One key issue, emphasised at a recent Model Fusion conference held at the Geological Society³, is to communicate confidence in our models and the uncertainties associated with them.

For the geologist traditionally trained to 'bite the bullet' and produce a single definitive and defensible interpretation, this represents a major cultural and intellectual challenge. This can be partly addressed through education and training, but perhaps most effectively by continuing professional development and working in partnerships with other scientists and users.

CONCLUSION

Our ability to represent the subsurface environment is radically changing. The future geological map, in digital form,



Above: Perspective view of UK geology showing BGS 3D model under construction as a series of key surfaces and grid of cross sections

will be just one of many outputs from a 3D dataset.

However, the skills, experience and knowledge embodied in the scientists involved in interpreting and modelling this dataset remain fundamental. Geological models, like in William Smith's day, will continue to require a geologist with core field skills to interpret and model the challenging complexities of the subsurface.

As the UK's geological survey, BGS will continue, for the foreseeable future, to complete field investigations and surveys to upgrade the NGM. We will still produce printed maps for educational or leisure use, where demand is sufficient. Far from the 'end' for geological maps, as some might perceive, we believe this to be the 'coming of age' of the geological model that truly captures the visions and understanding of William Smith and successive generations of geologists, and will define the role and purpose of geological surveys for future decades. ■

* British Geological Survey

ACKNOWLEDGEMENTS

The authors thank **Steve Mathers** and **Diarmad Campbell** for constructive comments. This article is published with permission of the Executive Director, BGS. All images NERC copyright.

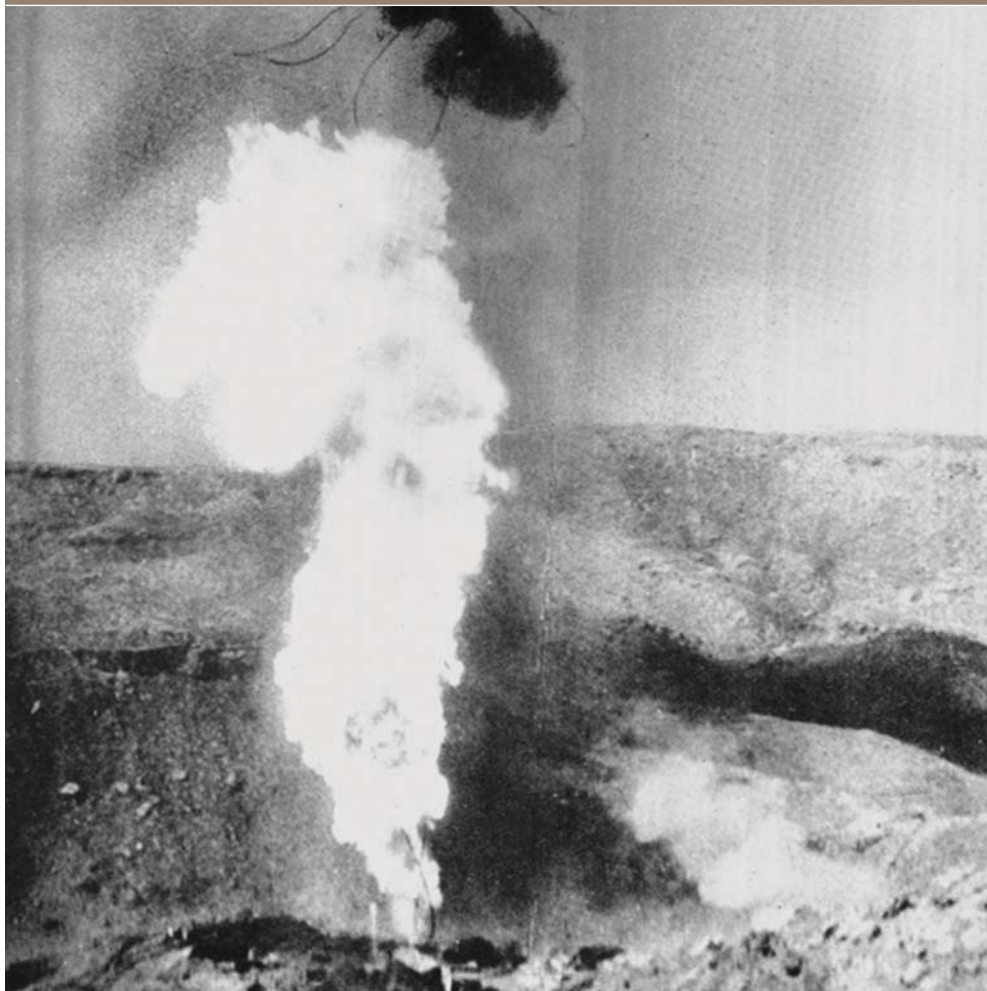
REFERENCES

- 1 BGS iGeology webpage: www.bgs.ac.uk/igeology/
- 2 National Infrastructure Plan 2011 HM Treasury, November 2011: www.hm-treasury.gov.uk/national_infrastructure_plan2011.htm
- 3 Model Fusion conference, Geological Society 28-29 November 2011: <http://www.model-fusion.org/>

READERS' LETTERS

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

RESTORE RIG 20 FOOTAGE!



Sir, Few geologists today have had the unforgettable experience of seeing *Rig 20*, BP's award-winning documentary (Palme d'Or, Venice Film Festival, 1951) showing the fiery blowout of a BP exploratory well at Naft Safid in the Zagros foothills of Persia. The climax of the film is a sequence which, filmed from a nearby hill top, shows the explosion that removed the well head.

Henry Longhurst, author of *Adventure in Oil*¹, wrote of how audiences witnessed "a demonstration of the forces of nature about which people talk with awe to this day. It is the highlight of a spectacular film made on the spot and is inevitably received by audiences with a momentary silence, followed by a gasp of wonder. A second or two after the explosion came the fantastic sight of a whole half mile of pipe shooting from the hole. It shot away high into the sky, far above the thousand feet of flame and here, twisting and turning and writhing like a serpent, it broke ... and fell slowly to earth."

Rig 20 is now available in DVD format from BP. But inexplicably, that unforgettable sequence has been cut! Now, the DVD shows

only an obscured upward view of the base of the smoke cloud filmed from beside the wellhead itself (filmed by an incredibly brave cameraman) with only a brief explanation of what was happening unseen, in the sky above. All that is left now to preserve that event is the (spine-chilling) still photograph in Longhurst's book, showing thousands of feet of drill-string flying through the sky.

I obtained the CD as a truly unforgettable training tool, showing the geological dynamics and hazards involved in hydrocarbon exploration and development and the role of overpressure in structural geology. However, without that "silence and gasp", it lacks the original impact. In this state I suspect that the film would not have received such accolades. I am therefore appealing for support in my call to BP to restore *Rig 20* to its original condition, and make it once again a wonderful and dramatic teaching tool for geoscientists and others working in the oil industry and academia.

Peter Jones

Reference: Longhurst, Henry, 1959, *Adventure in Oil, the Story of British Petroleum*. Sidgwick and Jackson, London, 286p.



Gregory Rift Valley, Kenya

EARTH BLOATS

Sir, I refer to the article in the December/January issue. This process of Mantle-derived uplift recognised in the North Atlantic Ocean surely has a much more extensive corollary, long recognised, in the Gregory Rift Valley of Kenya. In 1965¹ I showed that peneplains on Precambrian surfaces on the western margin of the Rift had been uplifted by a distensive process, prior to rifting. The same distensive process is obviously applicable on a smaller scale to plumes, and also caldera volcanoes, prior to subsidence. The distensive push can surely come only from the Mantle; though whether convection is involved is debatable. I wonder if it is necessarily involved in the short pulses from the Icelandic plume?

Joe McCall

Reference: McCall 1965: *Geology of the Sekerr Area Report 65*, Geological Survey of Kenya, 84pp.

OLD PRINT COPIES

Sir, From time to time there are notices in *Geoscientist* that offer back copy runs of journals free to a good home. I know from experience that there are rarely any takers. My solution was to use the Web to find a local sixth-form college teaching geology A-level and offer the journals to them. They were very quick to say "yes"!

Rick

Brassington



DIALOGUE ON RISK

Sir, Ten years ago, Professor Chris Clayton wrote *Managing Geotechnical Risk*. Since then we have entered a recession, come under pressure to reduce construction costs and to adapt to a low-carbon economy. Such changes, on their own, introduce additional risk; but many still feel that geotechnical risk continues to be sidelined, despite clear evidence that ground is hazardous and can impact significantly on the cost and delivery of projects.

Claire Symes, in her editorial in *Ground Engineering* (November 2011), spoke for many when she urged the industry to improve our understanding of the needs and difficulties of other sectors and stakeholders. Action is needed now, not only to address the understanding and impact of geotechnical risk, but to place it in context through dialogue with other construction professionals.

Initiating this dialogue was the purpose of a seminar that took place last month at Burlington House. It was the first of a number of activities aimed at better integrating geotechnical risk in the decision-making process, planned for this year by a review group led by Barry Clarke, (University of Leeds, Vice President ICE) and Paul Maliphant, (Halcrow, Vice President Geological Society) in conjunction with Constructing Excellence. It will help construction professionals understand the relative importance of geotechnical risk and



Reducing costs must not mean increasing risk

Image © Dmitry Kalinovsky / Shutterstock.com

how the value of ground investigation, design and construction can be brought home to others.

The geotechnical community has, for many years, argued the case for improved ground investigations, for developing ground models and employing engineers and geologists who are demonstrably competent in ground engineering. Yet much remains to be done in getting these messages across, and acted

upon. The case for improvement in 1993 (articulated in Without Site Investigations Ground is a Hazard) was supported by evidence of cost overrun, contract delay, failure to perform as expected, and even catastrophic failure. We need to gather new evidence to demonstrate the continuing importance of ground engineering to reducing risk.

Paul Maliphant

INSENSITIVE – AND UNWISE

Sir, I wish to comment on the photograph accompanying the article Glimpses of the past (*Geoscientist* 21.11 p07). In a year when the owner of a ground investigation company was convicted of corporate manslaughter after the collapse of an unsupported excavation - the unfortunate victim being a Fellow - it is surely insensitive and lacks common sense to reproduce a picture showing a geologist crouching in front of a vertical face that must be well over 3m high.

True, the exposed strata are competent rock, and the superlatives have been battered back (slightly). However, what sort of example does it send out to members of our profession that the Geological Society should appear to approve of activities such as those depicted? My company (GRM) emphasises to all staff that entry into unshored excavations below 1.2m should never be attempted. The excavation could well be perfectly safe; but might not a young geologist taking a casual look at the

magazine, be confused by the apparent double standard and decide that our H&S advice is flawed?

Chris Jerram

Editor writes: We received three letters about this picture, and *Geoscientist* accepts that – notwithstanding the solidity of the rock, the wearing of head protection, and the fact that the angle from which the picture was taken gave a false impression of the degree of battering – the picture used nevertheless illustrated an ‘unsafe’ working practice. The magazine subscribes to Society policy on such pictures (see www.geolsoc.org.uk/pub_ethics), and strives to avoid wherever possible the unremarked depiction of unsafe practice. However we should also take this opportunity to remind readers that *Geoscientist* is an independent publication and clearly states in its Disclaimer that appearance in *Geoscientist* does not imply Society endorsement, and nothing should be inferred regarding Society policy from any matter contained within its covers unless explicitly stated otherwise.



PEOPLE

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

CAROUSEL

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

PHIL ALDOUS



Phil Aldous, formerly Head of Environment and Quality Regulation at Thames Water has joined ESI as a Board Director and to lead the development of a SE regional office in Reading. Phil is an experienced environmental manager and project director with almost 30 years' experience in the UK water industry. Originally a hydrogeologist at the UK Water Research Centre, Phil has worked for Thames Water, and represented the industry nationally and internationally and contributed to research programmes through UKWIR. He holds degrees in environmental science, hydrogeology, and environmental law, and a diploma in management. He has served as a member of the Geological Society's Hydrogeology Group Editorial Board.

SHEILA MEREDITH

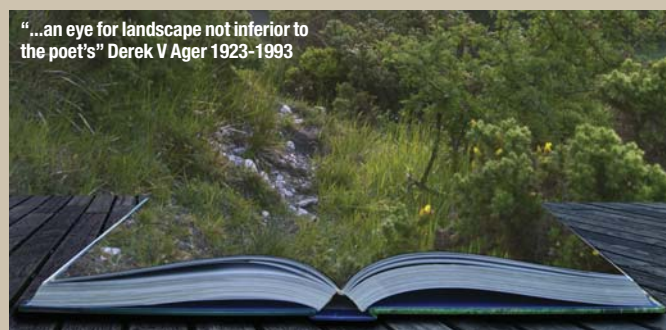


Sheila Meredith, who retired recently as Chief Librarian at the Society says: "I would like to thank everyone who sent their good wishes to me on my retirement and for all your contributions to my retirement gifts. I have been overwhelmed by your generosity and I will take with me many happy memories of my time at the Geological Society."

Wings of Poesy



Bryan Lovell OBE, President of the Society, looks back to Poetry Day, when writers, poets, and academics from arts and science came together at Burlington House



In July 2010 (*Geoscientist* 20.07 p21) I proposed a search for the best geological poetry, offering the prospect of an evening of high culture in Burlington House. Thanks to the outstanding efforts of our very own Literary Trio (Sarah Day, Michael McKimm and Ted Nield), the inaugural Geological Society Poetry Day, held on 10 October 2011, became something quite special. Just how special you can judge for yourself in the brand-new poetry section of the website: www.geolsoc.org.uk/geopoetry.

Here you will find, on a digital video (prepared by the indefatigable Kevin Perry), all the talks given during the day and the verse read in the evening, linked to copies of the poems themselves. There was even song: folk-singer Mike Excell's ominous ballad *The Proof in the Puddingstone* received its London premiere.

PERSUASION

Our resident poet Michael McKimm persuaded notable literary figures to join Fellows

and guests for the day. Judge for yourself the standard of verse, from visitors and Fellows alike. If you could not be with us, enjoy the website now; maybe react, and consider getting involved in the next event. Submit your own poems to Michael, as a claim on literary as well as geological immortality. And listen, please, to 'Field Notebook', an exquisite poem by Barbara Cumbers, which for me sets the standard to which we all might aspire.

Where will this lead? I'm delighted to say that I don't know; for never have I instigated a project that has moved so rapidly and wonderfully beyond the control of an individual. Yet I am a geologist, so I do nurse a practical hope: that our poetry will help to establish true environmental conviction where our scientific prose has failed us. We geologists will need every edge we can gain as the world glides into the Anthropocene, in a fashion brilliantly framed for us on Poetry Day by Jan Zalasiewicz.

Which contemporary poets will best express our 21st Century view of our relationship with Earth? Who can capture the intellectual revolution involved in our transition to a looming Anthropocene? Who will emulate Milton and Tennyson?

First, *Paradise Lost*:
*The ark no more now floats, but seems on ground,
Fast on the top of some high mountain fixed.
And now the tops of hills as rocks appear;
With the clamour thence the rapid currents drive
Towards the retreating sea their furious tide.*

Then, through such early geological heroes, Lavoisier, Hutton, Smith and Lyell, to *In Memoriam*:
*The hills are shadows, and they flow
From form to form, and nothing stands;
The melt like mist, the solid lands,
Like clouds they shape themselves and go.*

We have travelled from a feeling of mastery over all Earth's creatures, to passivity in the face of geological forces apparently way beyond our control, to a growing apprehension that we may be marking our own stewardship of the blue planet in a fashion we would not wisely choose. Poets and geologists have a common cause: a search for words to help us to understand what we do.



HELP YOUR OBITUARIST

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

IN MEMORIAM WWW.GEOLSOC.ORG.UK/OBITUARIES

THE SOCIETY NOTES WITH SADNESS THE PASSING OF:

Allen, Anthony William*	Humphreys, Adrian*
Collie, Michael*	Hutchinson, John
Cruikshank, Arthur	Kwolek, Julian Kenneth*
Edwards, Wilfrid Thomas*	Oates, Francis*
Friedman, Gerald M*\$	Price, Ivor C*
Gansser, Augusto*	Uko, Suzuki*
Hepworth, Barrie*	Young, Roger Andrew*
Hepworth, John	

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

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

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



Field notebook

It is drily factual - places, rock types, features, the numbers of my samples and where I found them, explanatory drawings. It records all that.

It does not say how the bracken changed colour through the day, through the year, how the fronds unrolled in the spring,

Stiffening like a butterfly's wings.

It does not tell how you found the pink spider rare in the north, camouflaged in heather bells,

How I quite failed to see it until you made it move

to bare its harmless fangs at your finger.

It does not say how you were always there

Even after you'd gone, a face glimpsed behind eyelids, a voice soaking into me like rain on parched soil.

From my notebook's pages, speckled sometimes where ink has run in water, I find my observations on the day you left seem much as any other.

My notebook records my work in detail.

There are marks on sketch maps like kisses on letters, all carefully numbered. Its precision surprises me.

© Barbara Cumbers

DISTANT THUNDER

A penny for their thoughts

Geologist and science writer Nina Morgan celebrates the effect of the Universal Penny Post on geological debate

The thousands of letters exchanged by 19th Century geologists and preserved in various archives provide a treasure trove of information for today's scholars working to unravel the development of geological theories and thought. The postal delivery service in the 19th C, particularly within London and between London and other major cities, was impressive. There were numerous deliveries each day and letters often reached their sketchily indicated destinations amazingly quickly. But this efficiency came at a price. In the early years of the 19th C postal charges were very expensive – rates were calculated on the basis of distance and number of pages in the letter, rather than by weight – and were paid by the recipient.

The introduction of the Universal Penny

Post in 1840 – the brainchild of postal reformer, Rowland Hill – changed all that, and had a notable effect on communication, be it personal, business or scholarly. In a letter dated 26 September 1841 and preserved in the archive of the Hope Library at the Oxford University Museum of Natural History, the geologist John Phillips, writing from his field area in Haverfordwest to his sister Anne at their home in York, waxed lyrical about the improvements resulting from the introduction of the Penny Post.

"...Thanks to Hill & her Majesty's late government, we at the distance of 350 miles sit & talk at ease ... Heyday! What is all this to prove? The advantage of Penny Postage, for though I do not think the expression of gentle and kindly feeling nonsense, I feel that to make you pay a shilling for what you

already know[,] that I am & ever will be your affectionate Brother[,] would be unreasonable."

Before the introduction of the Penny Post indulging in lengthy and detailed geological discussion by letter must have been a costly business. This could have deterred the less well-off from entering in. So far as I know, no one has studied the correlation between geological correspondence sent and the incomes of the senders and recipients, or calculated whether the average length of geological letters increased after the Penny Post was introduced. Nor have I heard any pathetic stories of poor geologists being unable to accept delivery of a potentially illuminating letter for want of funds to pay the postal charges. What is clear, however, is that the high postal charges prevailing before the introduction of the Universal Penny Post weren't enough to deter the Gentlemen of the Geological Society from writing to each other

frequently, voluminously – and often illegally!

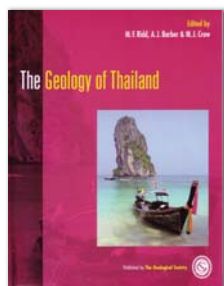
► ACKNOWLEDGEMENT

Sources for this article include an article about The Penny Black on the British Postal Museum & Archive website <http://postalheritage.org.uk/page/pennyblack> and a letter written by John Phillips from Haverfordwest to his sister Anne in York dated 26 September 1841 which is preserved in the archive of the Hope Library at the Oxford University Museum of Natural History.

► If the past is the key to your present interests, why not join the History of Geology Group (HOGG)? For more information and to read the latest HOGG newsletter, visit: www.geolsoc.org.uk/hogg, where the programme and abstracts from the Conference on Geological Collectors and Collecting are available as a pdf file free to download.



Sir Rowland Hill KCB FRS (1795 – 1879), father of the postal service



The Geology of Thailand

This is a weighty tome; yet in 1980, when I first visited Thailand, it could not have been written. Its content reflects the huge amount of work that has taken place within the last 30 years.

Research on Thai geology has been facilitated by the welcome given by the Royal Thai Department of Mineral Resources to those wishing to collaborate with Thai geoscientists. Knowledge of the geology of Thailand has benefited tremendously from petroleum exploration and production, both onshore and offshore. Of the 26 authors, only nine appear to be Thai, contributing to 10 of the 21 chapters. Each chapter is copiously referenced, and many Thai geoscientists will find their work well described when it is appropriate.

The book is well structured, dealing with the major stratigraphic units in a logical order, followed by sedimentary mineral resources (petroleum, coal), then igneous rocks, and metalliferous minerals. It is intriguing to see chapters on regional geophysics and tectonic evolution at the end of the book; but there is constant reference beforehand to the structural framework that has shaped this country's fascinating geology. So, the narrative sequence works. Highlights include the illustrations, which stir the imagination. Where else will you find a photograph of a petrified tree 72.22m long? Or of charred wood in situ in a laterite profile, tortoise shell weathering in Cretaceous sandstones, or images of the Buddha outlined in gold on a quarry face? Notwithstanding this there are some disappointments - I had hoped to see the chapter on granite include the detailed geochemical information that has been won over recent years, but this is mentioned with no presentation of data. Scarce mention is made of the potash deposits in the Cretaceous Maha Sarakham Formation, which is also disappointing given current world prices and demand.

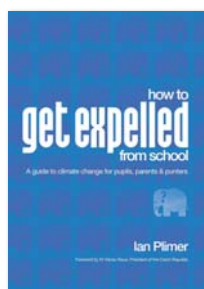
These misgivings aside, reading a book that integrates the geology of a country so effectively has given me ideas for a future research project - an important bonus. And if the idle reader has time to spare, he

or she can play 'spot the difference' by comparing the cover photograph with Figure 1.4; uncannily similar, but not identical.

Reviewed by David Manning

THE GEOLOGY OF THAILAND

M F RIDD, A J BARBER & M J CROW (eds) Published by: The Geological Society. Publication date: 2011 ISBN: 978-186239-322-6 (hbk); 978-186239-319-6 (pbk) 626 pp
List price: £100.00 (hbk); £50.00 (pbk)
www.geolsoc.org.uk



How to get expelled from school

This book is billed as a guide to kids and mentors; but there is perhaps a sub-text in the title, with Ian as the one who got 'expelled'. Since writing *Heaven and Earth* (2009) Plimer and his supporters have suffered many attacks. This book finds him unrepentant and brings character references from former long-term Prime Minister (John Howard, Liberal Party) who launched the book in Sydney, and President Vaclav Klaus (Czech Republic) who writes the Foreword - telling indicators of content.

Two critical events have occurred since Plimer's last book. First, only one Australian MP was elected in the last Federal election on a 'carbon tax' platform; Prime Minister Julia Gillard (Labor) famously stated that she would not introduce one. Nevertheless, Australia now has a punitive carbon tax. The Federal Government justifies the u-turn by appealing to science and a "consensus" that is not much in evidence when senior Australian scientists Bob Carter, Garth Paltridge and Ian Plimer question the integrity and quality of much climate science and the Australian Institute of geoscientists pointedly refuses to have a climate-change policy. Then there was the weather.

The ABC News website presents "Expelled" as an "anti-warmist manual", but Plimer is very pro-warming. Citing the Roman era, the Middle Ages and the period to 1998, he argues cogently that civilisations flourish in warm periods,

while cooling yields famine, disease and decline.

"Why did the Medieval warming happen when there was no heavy industry?" "How do we check independently the computer models of anthropogenic warming when the raw data and code are not public?" I searched for answers but, with the notable exception of the Geological Society of London and its recent publications on volcanic CO₂, found few direct counter-arguments.

I believe this chasm is not just political; it is one of science method. Climate activists are impressed by computer output derived from datasets collected by others, and don't want to hear pedantic questions about data validation. In contrast, Plimer's science is "old fashioned" - based on logical questioning, hypothesis-testing and scientific principles.

Plimer has clearly learnt from his opponents: the book puts political implications first and has only a few references, hidden at the back. Occasionally, he plays the man rather than the ball and repeatedly points out that, while geologists in the resource industry report subject to legal codes, no similar code exists for 'public policy' science - despite the fact that public policy science has budgets of billions of dollars. I doubt if Plimer needs to be re-admitted to school; but science and politics need him for his tenacity, clarity and critical analysis.

Reviewed by Julian Vearncombe

HOW TO GET EXPELLED FROM SCHOOL: A GUIDE TO CLIMATE CHANGE FOR PUPILS, PARENTS AND PUNTERS

IAN PLIMER Published by: Connor Court. ISBN: 978-1-921421-80-8 (pbk). 250pp
List price: A\$29.95, www.connorcourt.com

REVIEWS: COPIES AVAILABLE

Interested parties should contact the Reviews Editor, Dr. Martin Degg 01244 513173; m.degg@chester.ac.uk, only. Reviewers are invited to keep texts. Review titles are not available to order from the Geological Society Publishing House unless otherwise stated.

■ **Structural Geology Algorithms: Vectors and Tensors**, Allmendinger, R.W., Cardozo, N. & Fisher, D.M. (2011), Cambridge.

■ **This Shrinking Land: Climate change and Britain's coasts**, Duck, R. (2011), Dundee University Press.

■ **Spatiotemporal Data Analysis**, Eshel, G. (2012), Princeton.

■ **Understanding Earth's Deep Past: Lessons for our climate future**, National Research Council (2011), National Academies Press.

DIARY OF MEETINGS MARCH 2012

Meeting	Date	Venue and details
Water Futures Geological Society	6-7 March	Venue: Burlington House. See website for details and registration. Office contact: Steve Whalley T: 020 7434 9944 F: 020 7439 8975 E: steve.whalley@geolsoc.org.uk
Contaminated Land South East Regional	13 March	Venue: Bell Inn, Godstone RH9 8DX Time: 1830 for 1900 Speaker: Tbc Contact Convener: Jon Race jrace@southerntesting.co.uk
RiP Meeting 2012. Building a Habitable Planet: The geochemistry of Earth, Oceans and Atmospheres Geochemistry Group	15-16 March	Venue: Open University, Milton Keynes See website for details and registration. Convener contact: Christina Manning, Department of Earth Sciences, Royal Holloway University of London, Egham TW20 0EX E: c.manning@es.rhul.ac.uk
School Geology Challenge 2012 South Wales Regional	20 March	Venue: Coleg Sir Gar, Llanelli, SA15 4DN. See website for details. Time: 1730. Contact: Maria Clarkson E: swales.rg@geolsoc.org.uk
Earthquakes Central Scotland Regional	20 March	Venue: BGS Edinburgh. Time: 1745 for 1815 start. Speaker: David Galloway. Contact: Caroline Lasham E: caroline.lasham@woodmac.com
Open Meeting History of Geology Group	20 March	Venue: Burlington House. See website for details and registration. Convener Contact: Anthony Brook E: anthony.brook27@btinternet.com
Evening Visit to Hampshire Museums Geological Collection Solent Regional	23 February	Venue: Winchester. Speaker: Christine Taylor (Keeper of Natural Sciences, Hampshire County Council). See website for details Contact: Karen Allso (Secretary) E: karen.allso@ramboll.co.uk
Annual Research in Progress Meeting 2012 Metamorphic Studies Group	21 March	Venue: Department of Earth Sciences, University of Cambridge. See website for details and registration. Contact: Dr Kate Brodie, School of Earth, Atmospheric & Environmental Sciences, University of Manchester, Oxford Road, Manchester M13 9PL E: k.brodie@manchester.ac.uk W: msg.gly.bris.ac.uk/pages/mpages/rip11.html
Earthquakes, Volcanoes and God: Theological Perspectives on Natural Disasters North West Regional	22 March	Venue: University of Liverpool. Time: 1830. Speaker: Rev Dr David Chester (Reader, Department of Geography). Contact: Chris Berryman T: 01925 291111 E: geologicalsociety.northwest@gmail.com
Drilling for Victory: The Birth of Oil Exploration in the East Midlands East Midlands Regional	Tbc	Venue: BGS, Keyworth. Time: Evening tbc. Speaker: Andrew Naylor (University of Derby/BGS). See website for further information. Contact: Peter Jones E: p.f.jones@derby.ac.uk
Life at the Edge: Sinking Deltas Geological Society, Shell	28 March	Venue: Burlington House. Speaker: Prof. James Syvitski. A Shell London Lecture. For details see p.9
Big Palaeontology - Lyell Meeting 2012 Geological Society Micropalaeontological Society Palaeontological Association Palaeontographical Society	29 March	Venue: Burlington House. See website for details and registration. Twitter: #lyell12. Office contact: Naomi Newbold, Conference Office, The Geological Society, Burlington House, Piccadilly, London W1J 0BG T: 020 7434 9944 F: 020 7494 0579 E: naomi.newbold@geolsoc.org.uk

CENTURY ONE PUBLISHING
IS THE UK'S BRIGHTEST
AWARD-WINNING
CONTRACT PUBLISHING
AND ADVERTISING SALES AGENCY

To plan your ad campaign in
Geoscientist magazine contact:
Jonathan Knight

t: 01727 739 193

e: jonathan@centuryonepublishing.ltd.uk

w: www.centuryonepublishing.ltd.uk

OBITUARY



ARTHUR RICHARD IVOR CRUICKSHANK 1932-2011

Palaeontologist who specialised in the dicynodonts of Gondwana and Jurassic plesiosaurs

Arthur Cruickshank was born in Kenya on 29 February 1932, brought up in the UK, and worked professionally in Africa and the UK. His father was an engineer in Kenya, but young Arthur contracted chronic malaria and, aged six, was sent back to Scotland, where he boarded at Dollar Academy in Clackmannan, and later with a family in Coldstream, which gave him an experience of family life and his life-long love of the Borders. Cruickshank's National Service in the RAF did not lead to the hoped-for career, but he afterwards served with the Territorial Army. As well as carrying on with rifle shooting, in which he gained a Cambridge Blue, he took up gliding for its freedom and relaxation.

TRANSFERRED

At Edinburgh University Cruickshank transferred from his original degree in Geology to Zoology, doing his first research project on Scottish Carboniferous fishes. In 1958 he moved to the University of Cambridge for a doctorate under the legendary Rex Parrington, where his allocated beast was the dicynodont *Tetragonias*, a hefty plant-

eater. The resulting 45-page monograph was published in the *Journal of Zoology* in 1967 - a full, bone-by-bone account, with comparisons and considerations of feeding and locomotion. Cruickshank joined the 1963 British Museum (Natural History) expedition through East Africa, driving there from South Africa.

Cruickshank took up a lecturing post at the Edinburgh University Department of Zoology, where he met his future wife Enid, a student there. They married in 1963. He then lectured at Napier College before moving in 1967 to the University of the Witwatersrand, Johannesburg, where he was Assistant Director of the Bernard Price Institute for Palaeontological Research. This gave him access to a wide range of unstudied dicynodonts, allowing him to sustain his passion for these beasts, unlovely to the untutored, but significant early herbivores in both the Permian and Triassic.

He extended his interests to the basal archosaurs - important as

the ancestors of crocodiles and dinosaurs, and therefore birds. In the 1970s, he published definitive works on the basal archosaurs *Proterosuchus* and *Erythrosuchus*. This led to wider investigations of terrestrial ecosystems through the Permian and Triassic, in which he collaborated with palaeobotanist John Anderson.

TUTORING

Cruickshank returned to Scotland in 1978, but could not find a permanent post, other than tutoring with the Open University. The family moved to Leicestershire in 1985, and Cruickshank began to work on Jurassic plesiosaurs at Leicester Museum. He went on to describe important British, Australian, New Zealand, and South African specimens, sometimes using innovative imaging techniques to determine the internal skull structures. At this time, younger plesiosaur enthusiasts in Leicester were able to collaborate and learn from him.

Cruickshank's

modesty shone through when he was amazed by the numbers in attendance at a special session in his honour, on the Jurassic fossils of the West Country, at a 2009 conference in Street, Somerset.

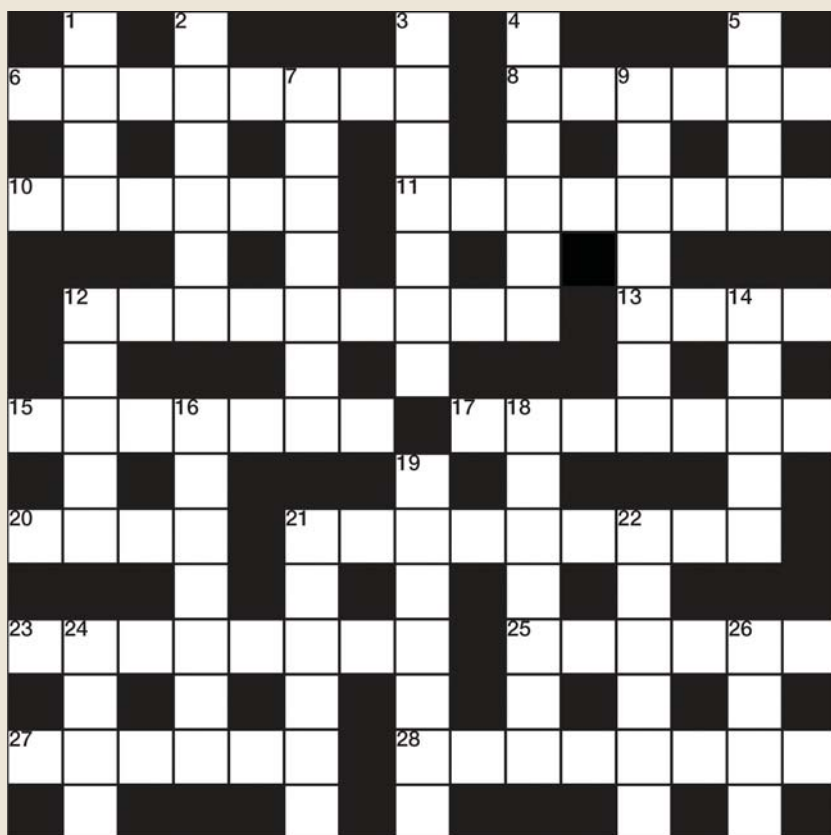
In 2006, the Cruickshanks moved back to the Borders and lived first in Denholm and then in Hawick. Arthur Cruickshank died on 4 December 2011 and is survived by his wife Enid, their children Peter, Susan and David, and three grandchildren.

► By Michael A Taylor & Michael J Benton

* We are grateful to Steve Tolan for this caption information. *Editor*

Cruickshank, newly arrived in South Africa in 1967, inspects specimen BP1/1/3639, found by James Kitching in Locality 16, upper Luangwa Valley ZAMBIA in 1961. The holotype of *Diademodon rhodesiensis*, it is housed at the Bernard Price Institute in Johannesburg*



CROSSWORD NO. 155 SET BY PLATYPUS**ACROSS**

- 6** Middle life (8)
8 Astronomical muse (6)
10 Furry suckler (6)
11 Conglomerate, Greekly (8)
12 Zhdanov's most biting term of abuse (9)
13 Well scrubbed Greek hero son of Telamon and Periboea (4)
15 Planetary interposition (7)
17 How deep is the ocean? No deeper than this (7)
20 Parallel normal faults with consistent dip and downthrow (4)
21 Calcium carbonate's orthorhombic polymorph (9)
23 Spinal bone (8)
25 This is what it does, unless it is extinct (6)
27 Burner pioneer (6)
28 Coiled cephalopod that vanished at the end of the 6a (8)

DOWN

- 1** Table mountain kicks butte (4)
2 Deep-throated marine seismic gun (6)
3 Habitual doubter (7)
4 Repository for a collection (6)
5 The forgotten grade between mud and sand (4)
7 Capital of the Loire, famous for its Maid (7)
9 Sawn blocks of rock, used for facing (7)
12 Crystallographically flat plane on a 3D geometric body (5)
14 Coloured, banded, chalcedonic silica (5)
16 Palaeozoic seaway that closed during the Caledonian Orogeny (7)
18 Reefal accumulation of living marine organisms (7)
19 Native of carbonate-rich island country in the Atlantic, east of Florida and Cuba (7)
21 Fancy flats next door to Burlington House, where according to Wilde Mr Ernest Worthing had a set (6)
22 Spiky-spined lizard native to Caribbean and South and Central America (6)
24 Large flightless birds (4)
26 Shared factor between Desmond and Degas, other than a lower second class degree. (4)

WIN A SPECIAL PUBLICATION

The winner of the Dec/Jan Crossword puzzle prize draw was **Robyn Shaw** of Brisbane, Australia.

All correct solutions will be placed in the draw, and the winner's name printed in the April issue. The Editor's decision is final and no correspondence will be entered into. **Closing date - February 27.**

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

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

Name

Membership number

Address for correspondence

Postcode

SOLUTIONS NOVEMBER**ACROSS:**

6 Infaunal **8** Carbon **10** Extant **11** Trachyte
12 Gravitite **13** Umbo **15** Calyxes/Calyces
17 Aureole **20** Deer **21** Barnacles **23** Moraines
25 Inbred **27** Gangue **28** Overlain

DOWN:

1 Onyx **2** Sahara **3** Plateau **4** Octane **5** Sort
7 Nitride **9** Rehouse **12** Grade **14** Bales
16 Yardang **18** Uralite **19** Erosion **21** Bunter
22 Labels **24** Opal **26** Emit

EARTHWORKS

www.earthworks-jobs.com

More than 330,000 unique users per month point their browsers to www.earthworks-jobs.com to see the latest, worldwide, research, academic and professional jobs in the Geoscience, Environmental, Engineering, Water, Mining and Oil & Gas Sectors.

Advertisers e-mail copy to
copy@earthworks-jobs.com
for publication within 2 hours of receipt,

call +44(0) 1223 248346
fax +44 (0) 1223 709513.



Earthworks-jobs.com



The 2012 Fermor Meeting of the Geological Society

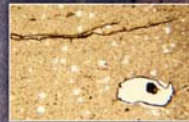
The Neoproterozoic Era: *Evolution, Glaciation, Oxygenation*

19-21 September 2012

The Geological Society of London, Burlington House, London

With an optional field trip to the Ediacaran geology of Charnwood and the Longmynd, English Midlands, 22-23 September

Call for abstracts: deadline Friday 22nd June



This conference brings together a diverse group of geoscientists interested in the extraordinary environments, biotas and Earth system responses of the Neoproterozoic. Presentations will be broadly grouped under four inter-related themes: (1) Sequencing the rock record, (2) proxy record data for oceans and atmosphere, (3) co-evolution of life and the Earth system, and (4) modelling the Earth system. There will be extended group discussions on future research agendas on the third afternoon.

Keynote and invited speakers:

Theme 1 (Sequencing): Doug Benn, Paul Hoffman, Galen Halverson, Francis Macdonald, Adam Maloof, Dave Selby and Jenny Tait
Theme 2 (Proxies): Magali Ader, Huiming Bao, Don Canfield, David Johnston, Simone Kasemann, Tim Lyons, Simon Poulton and Nick Tosca
Theme 3 (Co-evolution): Martin Brasier, Nick Butterfield, Andy Knoll, Guy Narbonne, Tony Prave, Erik Sperling, Phil Wilby and Shuhai Xiao
Theme 4 (modelling): Christian Bjerrum, Tais Dahl, Raymond Pierrehumbert, Gilles Ramstein, Andy Ridgwell and Dan Rothman

Convenors:

Ian Fairchild (Birmingham), Dan Condon (NIGL), Tim Lenton (Exeter) and Graham Shields-Zhou (UCL) with field trip coordination by Martin Brasier (Oxford)

The meeting is sponsored by the Life and the Planet programme funded by the Natural Environment Research Council and the Gaia: Earth Systems Science Group of the Geological Society.

Call for papers and further information

For information about submitting a paper, please visit our website at <http://www.geolsoc.org.uk/gsl/events/fermor12>

For further information about the conference please contact:

Naomi Newbold
The Geological Society, Burlington House, Piccadilly, London W1J 0BG
T: 020 7432 0981 E: naomi.newbold@geolsoc.org.uk
Convenor contact: Ian Fairchild (E: i.fairchild@bham.ac.uk)

WHEN KNOWLEDGE COUNTS...



...COUNT ON FUGRO

Our well-established technical courses in Cone Penetration Testing and geophysics are now linked to a new 1 day course "An Introduction into the Challenges of Acquisition and Interpretation of Geological, Geotechnical and Geospatial Data for the Offshore Renewable Industry". This means you may choose a 1, 2 or 3 day course at a range of venues.

To register send a message to
s.poulter@fes.co.uk
www.fes.co.uk/courses

New Courses for 2012

GeoConsulting & Site Investigation for the Offshore Renewable Industry

Thursday May 3rd 2012 - Wallingford, Oxon

Onshore Cone Penetration Testing*

Friday May 4th 2012 - Wallingford, Oxon

Friday June 15th 2012 - Edinburgh

Geotechnical and Geo-environmental Geophysics*

Wednesday May 2nd 2012 - Wallingford, Oxon



William Smith Meeting 2012

Strata and Time: Probing the Gaps in our Understanding

4–5 September 2012

Burlington House, London, UK

An international conference to explore the relationship between the preserved strata of the rock record and the passage of geological time. Stratigraphic practice can only be as sound as the underlying assumptions relating strata with time. Our focus will be on identifying, evaluating and updating the models that lie behind stratigraphic methods. The scope of the conference will extend from the controls on preservation of strata in the record, through the qualitative and statistical properties of strata, to the implications for analysis, interpretation, modelling and prediction.

Call for papers:

Contributions (oral or poster) are invited, around the following themes:

- Accumulation of the record: rates and gaps
- The biostratigraphic record: accumulation and quantification
- Subsurface stratigraphy: contributions from well and seismic data
- The architecture of the record: statistical and modelling approaches

Abstracts of up to 250 words should be sent to
ellie.duncanson-hunter@geolsoc.org.uk by 30 April 2012.

The 2012 William Smith Lecture will be given by Professor Peter Sadler (University of California, Riverside).

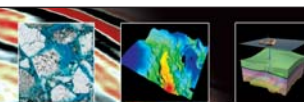
Convenors:

David Smith • Robin Bailey • Peter Burgess • Alastair Fraser

Further information

For further information about the conference, please contact:

Ellie Duncanson-Hunter, Conference Office, The Geological Society, Burlington House, Piccadilly, London W1J 0BG
T: 0207 434 9944 F: 0207 494 0579
E: ellie.duncanson-hunter@geolsoc.org.uk W: www.geolsoc.org.uk/wsmith2012



Corporate Supporter:



Conveners:

Mike Stephenson
BGS

Mike Simmons
Neflex

Stewart Molyneux
BGS

Conference Sponsors:



In Association with the Stratigraphy Commission

High Fidelity: The Quest for Precision in Stratigraphy and its Applications

16–17 May 2012

The Geological Society, Burlington House, Piccadilly, London



New Abstract Deadline 29 February 2012

There has been a quiet revolution in the precision with which geochronologists and biostratigraphers are able to date and correlate rock sequences. Recent advances in radiometric (IDMS U-Pb dating of zircons and computer-based methods of quantitative biostratigraphy) now make it possible to produce sub-100 k.y. resolution as far into deep time as the Palaeozoic. Orbital cyclicity has been demonstrated in the Cenozoic and Mesozoic and has been suggested for Palaeozoic successions, allowing age calibration using the 40–400k.y. cycles. This conference will bring together chronostratigraphy specialists, biostratigraphers and applied geologists to explore new synergies to bring the 'new dating' into ever wider applied and practical uses.

Keynotes:

Bruce Levell, Chief Scientist Geology, Shell
Felix Gradstein, Museum of Natural History, Blindern, Norway
Thijs Vandenbrouke, Université Lille 1 - Sciences et Technologies, France
Peter Sadler, University of California, Riverside
Andy Gale, University of Portsmouth

Conference fees:

£150 for fellows of the Geological Society, £250 for non-fellows, and £50 for students

For further information and registration, please contact:
Steve Whalley, Event Co-ordinator: +44 (0)20 7432 0980 or email: steve.whalley@geolsoc.org.uk



At the forefront of petroleum geoscience

www.geolsoc.org.uk/petroleum

*Adventurous geologist who made perilous expeditions in search of oil and enthused his students with his passion for discovery.
(The Times, Newspaper, 17 October 2008)*

PESGB Stoneley Lecture Series

The PESGB are proud to announce the next lecture and date to continue our Stoneley Lecture Series in memory of Professor Robert Stoneley.



"Earth, Exploration & Excitement: travels in modern geology"

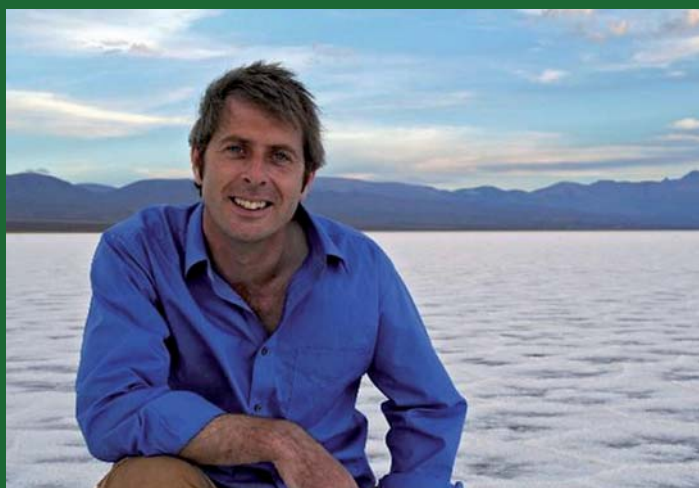
Professor Iain Stewart

Tuesday 13 March 2012,
Central Hall, Westminster, London.

Doors open at 6pm, Lecture starts at 6.30pm

Tickets cost £15 and £5 for students*

*(proof of status will be required on the evening)



Iain Stewart is professor of Geoscience Communication at the University of Plymouth.

He is also a television and radio presenter, and has worked on a variety of programmes such as 'Journeys From the Centre of the Earth', 'Earth: The Power of the Planet', 'Hot Rocks', 'The Climate Wars' and 'How Earth Made Us'.

His current series, 'How to grow a planet', can be seen on BBC 2.

Book Now: www.pesgb.org.uk

Petroleum Exploration Society of Great Britain, 5th Floor, 9 Berkeley Street, London, W1J 8DW

Tel: +44 (0)20 7408 2000 • Fax: +44 (0)20 7408 2050 • Web: www.pesgb.org.uk • Email: pesgb@pesgb.org.uk



"What deal making is all about."

Dr. James Edwards
Equinox Exploration Company
U.S.A.

A truly global A&D conference

For 11 years — APPEX, the Prospect and Property Expo — has brought together principals, senior managers, business developers and new venture managers for an unmatched opportunity to network and do business with NOCs, governments, financiers and global E&P deal-makers and decision-makers.

- Your one-stop shop for global upstream opportunities
- The key forum for networking and international deal development, carefully designed to let you do real business
- Connect with buyers, properties and prospects from around the globe – find the next deal first
- Explore a programme of regional and topical speakers to keep you on top of worldwide trends and discoveries, including finance forum, prospect forums, and the international pavilion
- Discover thousands of exploration products and services from around the world
- Meet, discuss and negotiate deals with global decision makers

Whether you're looking to buy or sell deals, expand into new areas, find new strategic partners, or just stay on top of the industry, APPEX is the place to be.

ORGANISED BY



ENDORSED BY



MEDIA PARTNERS

CEO ExPro

Oil and Gas Investor

upstream
The International Oil & Gas Newspaper

europe@aapg.org

www.appexlondon.com

+44 (0)207 434 1399