

Geoscientist

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Browne and gown

Ted Nield wonders if Lord Browne of Madingley FGS envisages an enhanced role for learned societies in his recent proposals for Higher Education...



Lord Browne's much anticipated report *Securing a sustainable future for higher education* (October 2010) is the most far-reaching review of the sector since Lord Dearing's report-to-end-all-reports was published in 1997. Mainstream media coverage focused on the most immediately contentious aspects of the former BP Chief Executive's recommendations, such as removing the student number cap and raising tuition fees. However he also suggested that science (and other "strategic" subjects, defined presumably by government and industry) should be protected from his proposed removal of course subsidies (which would effectively privatise university arts, humanities and social sciences). Another boost for scientists came a week later, when the Chancellor announced his intention to peg state STEM funding at current values - a real-terms decline over four years of a mere 9%.

However another of Lord Browne's suggestions went almost unremarked. This was his suggestion to replace the Higher Education Funding Council (HEFCE) with a Higher Education Council. It may not sound dramatic, but this new body would also subsume the current Office of Fair Access, the


Office of the Independent Adjudicator and the Quality Assurance Agency (QAA) - and would assume responsibility for, in Browne's words, "setting and enforcing baseline quality levels" in degree courses.

Attempts to define an acceptable regime of external quality assurance for UK universities have been mired in difficulty for 20 years. Two processes - quality *assessment* (by funding councils) and quality *audit* (by the universities' own Higher Education Quality Council, HEQC) emerged in 1994.

"Assessment", essentially the inspection of teaching, existed to ensure that the State got value for taxpayers' money. "Audit" meanwhile inspected institutions' quality assurance mechanisms (e.g., the external examiner system) and reported on how well they were working - the self-policing of universities' self-policing. Universities may have resented external inspection, but they would have rightly decried any attempted government interference in course provision as an unacceptable attack on the principles of academic freedom, and backdoor nationalisation of the academy.

Only three years later, these complimentary processes of internal audit and external

assessment were brought together under a new Quality Assurance Agency (QAA), set up as a company limited by guarantee owned by institutions, but with some directors nominated by funding-councils. Four years later still, after even more wrangling, the QAA's three-fold quality assurance framework, (comprising scrutiny of outcome standards, quality of learning opportunities and of institutional quality management) was accepted and has been operating ever since. In August 2000, HEFCE estimated the annual cost of all this at between £45m and £50m.

Yet, throughout the whole soul-sapping "quality" malarkey, with its doublethink and doublespeak, nobody ever seriously suggested that someone outside universities should set "baseline quality standards" for degrees. Much depends on what Lord Browne means by this perhaps deliberately vague formulation; but it sounds as though he means "baseline standards". Yet who, if not university academics themselves, *could* set such standards? Could our distinguished Fellow be envisaging here a role for learned and professional bodies (who already set some "baseline standards" when accrediting degree programmes as part of their system of professional formation)? 



Front cover: A large ammonite, *Titanites* sp., emerges from the Portland Stone Formation (photograph by Richard Edmonds). See p.20.

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Fellowship Queries The Geological Society, Burlington House, Piccadilly, London W1J 0BG Tel:+44 (0)20 7434 9944, Fax: +44 (0)20 7439 8975, Email: enquiries@geolsoc.org.uk, Society website: www.geolsoc.org.uk

Library Tel: +44 (0)20 7432 0999, Fax: +44 (0)20 7439 3470, Email: library@geolsoc.org.uk.

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Send us a sign

Brian O'Driscoll takes issue with the idea that all palaeomagnetic coring is "vandalism", and thinks bodies like SNH could do more to help.*



Recent articles published in *Geoscientist* by Dr Colin MacFadyen of Scottish Natural Heritage (SNH) have raised serious concerns about drill coring for

geological samples, both at Sites of Special Scientific Interest (SSSI) and elsewhere (*Geoscientist* 20.1 January 2010). Although essential in certain instances for geological research, sampling in this way potentially damages the visual appeal and educational value of important rock outcrops. Certain geological localities should simply not be drilled (and even hand-specimen sampling be carried out thoughtfully and responsibly) out of respect for other scientists and non-academic users of SSSIs.

The conservation of world-class outcrops of significant scientific relevance must remain our ultimate goal, and raising awareness among the general public as well as the scientific community

is surely the key to achieving this. Certainly, this would be better than responding, reactively, as Dr MacFadyen has done with his recent articles. I find his language to be emotive and provocative, and believe it is simply neither correct nor fair to liken geologists carrying out legitimate scientific sampling to 'vandals'.

Geology is a subject taught in the field. Students will learn and gain the greatest appreciation of their subject in areas where geological diversity is coupled with good quality exposure in outcrop. In the UK, we also have that unique history, in that many of geology's landmark scientific ideas originated here, often at outcrop (witness Hutton's unconformity, at Siccar Point). It is also worth remembering that the number of geologists (students as well as more senior academics and visiting researchers from abroad) carrying out fieldwork and mapping in 'classic' British localities is increasing at a faster rate than ever before.

For all these reasons, greater emphasis is needed on conservation issues, by raising awareness and providing clear information on-site at SSSIs. Provision by SNH of on-site instruction and educational materials would represent a more proactive and, I believe, effectively preventative approach to dealing with greater numbers of SSSI users (scientists and the general public alike) in Scotland in the future. Signs or boards, written simply and without scientific jargon, delineating SSSI areas/boundaries and the reasons for their designation, would be appropriate.

This approach is more in line with international conservation strategies, particularly in the USA, where National Parks and State Forests typically provide very clear on-site information about what is allowed and what is not. This type of management exists in certain locations in Scotland (e.g., Arthur's Seat, Knockan Crag and Clashach Quarry), where interpretive materials are in place for visitors and tourists. Unfortunately, hundreds of SSSIs throughout Scotland and the rest of the UK do not, and for the first-time user, finding online information on SSSI designations is a seriously non-trivial process.

If a site, geological or otherwise, is worth assigning SSSI status, then surely it is worth providing accessible and scientifically informative on-site signage?

** Lecturer in Igneous and Metamorphic Petrology School of Physical and Geographical Sciences, Keele University*

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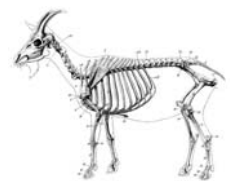
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Does something in your geological life really get your goat? If you can rant entertainingly about it in 500 words, share your frustration in *Soapbox*. Email your piece, and a separate mugshot, to the Editor at ted.nield@geolsoc.org.uk.



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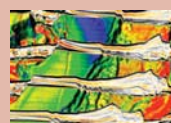
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In the next issue (February 2011) - *Social volcanology on Merapi*

Carousel



Myint Win Bo has been promoted Senior Principal/Director (geo-Services) by DST Consulting Engineers Inc., Canada. Dr Bo, who specialises in Geotechnical and geo-environmental engineering, joined DST Canada in mid 2007 after working in the UK as a Technical Director in Faber Maunsell/AECOM, UK.




Peter Cook, Director of BGS until 1998, has not been idle since returning to Australia. He was appointed Chief Executive of the Petroleum Research Centre, where he initiated a program on

carbon dioxide storage, which became the Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC) (2003). This has just been re-funded for a further five years. In 2004 Cook initiated Australia's only operational storage project, the CO2CRC Otway project, recognised as a leading international CCS research initiative. This year (September 2010), he was given the Greenman Award from the International Energy Agency (IEAGHG) in Amsterdam, and acknowledged in his speech of acceptance the pioneering CCS work of BGS in the early 1990s.

Neil Breward (British Geological Survey) has been appointed Regional Councillor for the UK and Republic of Ireland by the Association of Applied Geochemists (AAG). He would like to receive reports of any developments in geochemistry taking place within the designated area, with a view to publicising these on the AAG's website, and possibly in the journal *Elements*.



Simon Winchester, author, journalist and broadcaster, has accepted the Order of Magellan of the Circumnavigators Club. This award is bestowed on individuals "dedicated to advancing peace and understanding in all parts of the world". Winchester will follow

such individuals as General Douglas MacArthur (1961), Neil Armstrong (1971), Norman Vincent Peale (1987), and Walter Cronkite (1997). Winchester has also recently been made Hon. LLD by Dalhousie University. 

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

Obituaries



Obituaries appear in *Geoscientist* as soon as possible after they are published at www.geolsoc.org.uk/obituaries, where you will also find instructions to authors. If you wish to write an obituary for any of the deceased marked with an asterisk in the *Deaths* column, please contact Ted Nield to be commissioned. All communication should be addressed to ted.nield@geolsoc.org.uk. Please do not write anything until you have been commissioned.

John Patrick Nicholas "Nick" Badham 1947 – 2010



Nick Badham died suddenly at the early age of 63 following a heart attack while mapping in Almeria, Spain. Nick was a highly respected international economic geologist, never happier than when he was in the field, where he had an excellent eye for detail. He was born in Singapore, where his parents were stationed with the British Army. He grew up in military surroundings, largely in Germany and was

educated at Cheltenham College. He obtained his first degree from Oxford in 1969 and his doctorate at the University of Alberta in 1973 where he studied silver deposits in the Lower Proterozoic Slave Province.


Nick went from his PhD directly to a lectureship in the Geology Department at Southampton University, which he held for 10 years, establishing an economic geology research group. Most of his 30+ peer-reviewed papers originate from this period, aided by a flourishing group of graduate students. He was a breath of fresh air in the Department when I joined in 1977, where his great passion for geology and particularly for mineral deposits engaged and motivated students. He established economic geology as a characterising feature of the Southampton curriculum. From that time, a high proportion of Southampton graduates have entered the minerals industry, many now occupying senior

management positions. In 1979 he was awarded the Institute of Mining and Metallurgy William Frecheville prize.

In 1982 Nick left academia to develop a successful career in mineral exploration. He joined Selection Trust, which shortly afterwards became BP Minerals International Ltd. When, in late 1988, BP sold its mineral interests to Rio Tinto Mining and Exploration, Nick was appointed chief geologist to the new Exploration Research Department and played a leading role in its exploration strategy. In 1984 he was extremely lucky to survive a skull fracture in a 22m freefall down a disused mine shaft in the Pyrenees. Many thought he would never be the same again, but with characteristic determination he made a complete recovery.

In 1996 Nick left Rio Tinto and became an independent consulting geologist, setting up Nibex exploration. This enabled him to continue his passion for metals and practise his considerable field skills. He had an impressive international client list and was working for one of them when he suffered his cardiac arrest.

Nick was a staunch support of the Geological Society. He was a founder member and regular attendee of the Mineral Deposits Studies Group where his contributions were highly valued and will be greatly missed (and possibly also his famous limericks). He maintained academic contact through visiting positions with Kingston and Southampton universities. He acquired a considerable reputation for his ability to ask a penetrating question, to 'think outside the box' and for his irreverent sense of humour.

In Over Wallop, Nick was a well-respected member of the community as testified by the overflowing congregation at his funeral. In his spare time he was a keen gardener and field sportsman. He is survived by his wife Trisha, his mother Edith and sister Judy, his five children (Richard, Harry, Tommie, Tim and Edward) and six grandchildren (Louis, Oliver, Aveline, Alexander, Dorothy and William). 

Jim Andrews, with grateful acknowledgments to Trisha Badham.



Alun Howard Rhys Davies 1954 – 2010

Alun Davies was a well respected and very popular geologist in the South Wales region, where he worked for a number of the major engineering consultancies throughout his career.

Alun was born in Pontarddulais (the 'Bont'), near Swansea in 1954. A fluent Welsh speaker and proud Welshman,

he attended Gowerton Grammar school and graduated from Swansea University with a degree in geology in 1977. He began his professional career with British Gas as a Cartographic Draftsman / Surveyor. In 1978 he moved to Maunsel and Partners and worked with them as a Geologist until 1986. He then took a job with WS Atkins and Partners in Swansea as an Engineering Geologist, where he worked in their busy geotechnical department for over 20 years. During his time with Atkins he studied part-time at Cardiff University for a Masters degree in Environmental and Engineering Geology, graduating in 1994.


In 2006 he sought new challenges and moved a short distance across the River Tawe to Ground Engineering Ltd in Llansamlet, taking up a position as Associate Director. Following a company reorganisation he left in 2008 and worked for a short time with Quantum Ltd. in Bynea. Recently he had been working as a self employed consultant, and at the time of his death was contracted to EM Drilling in Sierra Leone.

During his career Alun was involved in a number of landmark Welsh projects including the Second Severn Crossing, Millennium Stadium, A55 Holyhead improvement scheme and BP Llandarcy remediation.

Alun took great pride in his professional qualifications, becoming a Fellow of the Geological Society in 1979, a Chartered Geologist in 2000, a European Geologist in 2001 and a Chartered Scientist in 2005. He was well known in the Welsh geotechnical community, and was an active member of the Ground Engineering Group and the South Wales branch of the Institution of Civil Engineers, sitting on committees in various capacities during his career.

Alun loved sport and in his early years played football for the Bont and for Swansea University. He was an accomplished downhill skier and more recently he had become an enthusiastic golfer. He could be found most weekends chasing a little white ball across the countryside.

Alun worked with a level of professional integrity that is a mark of his generation of geologists and engineers. He provided sound and practical advice, offered assistance freely and provided guidance without hesitation. He was always the first to offer to make the tea and, somehow, it always tasted better when it was made by him.

I had the privilege of working with Alun for over 20 years. I will remember him as a friendly, generous, dependable and most likeable individual. He died suddenly on 19 September 2010 while working on a ground investigation project in Sierra Leone. He leaves to mourn his wife Catherine, sons James and William and a great many friends and colleagues. 

Nick Brown

Deaths

The Society notes with sadness the passing of:

Coleman, John Arthur R*

Davies, Rhys*

Fitch, Frank John

Harwood, H J*

Jones, James Peter*

Locke, Matthew*

Mann, Paul Dunstan*

Morley, William*

Richardson, Alfred James *


Wilson, Henry Hugh *

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 in shown in bold. Fellows for whom no obituarist has yet been commissioned are marked with an asterisk (*).

If you would like to contribute an obituary, please email ted.nield@geolsoc.org.uk to be commissioned. You will receive a deadline for submission. 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.

Help your obituarist

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



Three generations of the Curry family were present in Chichester on Saturday, 2 September 2010, to witness the launch of the book *Micropalaeontology, Sedimentary Environments and Stratigraphy: A Tribute to Dennis Curry (1912-2002)* and to receive signed copies writes John

Whittaker. The event was held at the West Sussex Record Office, through the kind cooperation of Tim and Alison McCann.

Dennis Curry was one of the UK's most noted amateur geologists - "the professional amateur", as he has been called. A genuine and modest polymath, not only was he a most successful businessman (as managing director and chairman of Currys Ltd.) but also a gifted scientist who published over 120 papers in his lifetime and became honorary Professor of Marine Geology at University College London. He was also a generous philanthropist.

Edited by John Whittaker (Natural History Museum, London) and Malcolm Hart (University of Plymouth), the book's 300 pages contain 12 chapters, each covering a topic, theme, area, or stratigraphical interval in which Dennis Curry had an interest and undertook seminal research in his lifetime. These include papers from friends and former colleagues in Britain and France on wide-ranging aspects, especially of micropalaeontology, as well as Hampshire Basin stratigraphy and palaeoecology, English Channel sedimentology, and strontium-isotope stratigraphy. The book also contains a review of the valuable collections (especially of molluscs and foraminifera) that he presented to the Natural History Museum, authored by the Curry curators themselves (who had been funded through Dennis Curry's Charitable Trust). It is pleasing to report that a good proportion of these authors came from across the UK on Saturday to celebrate Dennis's life and work. The editors paid tribute to the late Jake Hancock for his initial editorial work, highlighting potential contributions and "persuading" authors to write them.

Somehow or other, in spite of the book's long gestation, its publication came as a complete surprise to the family (picture) - especially to Dennis's daughters, Margaret Curry Jones and Patricia Edmond, who had helped the editors in so many ways without knowing the real purpose of our endeavour! Patricia Edmond's grandson Oliver (aged five-and-a-half), I think, summed up the family's reaction when heard to remark ..."So, Great-Grandpa was famous!" Indeed he was, and is much missed.

The Micropalaeontological Society is pleased to mark the remarkable life and work of Dennis Curry with this volume, which is published in their Special Publication Series by The Geological Society Publishing House. This is also most fitting, since in his lifetime, Dennis gave a very large donation (in the form of Currys shares) from which the Geological Society of London (GSL) later set up the Publishing House. Other geological societies, most notably the Geologists' Association, were also close to his heart and benefited financially. 

- Further information about the book and how to purchase it can be found on the TMS (www.nhm.ac.uk/hosted_sites/tms/specialpubs.htm) and GSL (www.geolsoc.org.uk/page7772.html) websites.

DISTANT THUNDER

Pay and display

At this expensive time of year geologist and science writer Nina Morgan chases up some long overdue invoices...

Some of the most important examples of bones from what were later to be classed as dinosaurs were uncovered not by geologists, but by humble quarry workers who earned much-needed cash by selling their finds to scholars. During the Nineteenth Century the men working in the Stonesfield slate mines near Oxford provided the Reverend William Buckland, Reader in Mineralogy at Oxford from 1813 and Reader in Geology from 1818, with a number of important dinosaur bones now on display at the Oxford University Museum of Natural History (OUMNH). A letter addressed 'For the Revd Buckland, Corps



College, Oxford' and preserved in the Buckland archives at the OUMNH illustrates a typical approach (all spelling *sic*...).

'Stonesfield Dec[ember] the 3 [1814]

Rev Sir, this comes to lot you no ther is a large bone found in a sleat pit very perfect not Broken in a large stone the property of Charles Hawes, Sleat Digger.

John Oliver have leatly found a Large Bone very much Broken supposed to be some part of a horse.

December the 1 I, David Oliver, found a large Rib Bone about two feet in length but very mutch Broken. Sir, if you please to come and see them.

I am your Hombler Servnt David Oliver'

Buckland's pencilled annotations, dated "Decr 19 1814", indicate that Buckland was quick off the mark when it came to viewing the specimens, for which he offered a total of 11s 6d. But it took him a good two months before he got round to paying the bill. On the same page, Buckland also notes that he still owed David Oliver £0 10s 6d for specimens sent during the University Long Vacation, six months earlier.

For someone who was obviously keen to obtain the best specimens, this seems a rather strange way of doing business. And to top it off, no records exist to show this latter bill was ever paid. The telephone directory indicates that there are still a number of Olivers living at Stonesfield. With government cuts looming, interest rates down and Christmas fast approaching, Museum paymasters, be warned!

A merry Christmas to all. 🐉

Acknowledgement

This vignette is drawn from a talk given by Philip Powell of the Oxford University Museum of Natural History at the William Buckland 150th Anniversary Symposium held in Oxford on 12 August 2006.

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 the HOGG website at: www.geolsoc.org.uk/hogg.

If, like William Buckland, you are a keen collector you will be interested to know about the HOGG conference on Geological Collectors and Collecting, planned for 4-5 April 2011 at the Natural History Museum, London. To receive further information and announcements about the conference, e-mail: ninamorgan@lineone.net.

* *Nina Morgan is a geologist and science writer based near Oxford.*

Sciencefest

Sarah Day reviews two approaches to the “science festival” and wonders if science can really be fun...

In the weeks leading up to the Comprehensive Spending Review scientists, like everyone else, fought hard to justify their funding. Science is useful. Science boosts the economy. Science improves our lives.

Yet science has never been keener to show that like the arts, it can be entertainment too. Not content with being a useful but remote part of life for most of us, science is on a mission to prove that it can also be *fun*, and has taken inspiration from the art world to do it. Enter the ‘science festival’.

It is often claimed that the British Science Festival – formerly referred to as the annual meeting of the British Association (for the Advancement of Science) – is the world’s oldest science festival, dating from 1831. But its roots lie in a very different tradition – as an annual meeting for scientists, when the most innovative idea around was that science was useful, practical and improving – not just an intellectual exercise.

The modern science festival idea is much more recent. Howie Firth, who ran the very first in Edinburgh and now directs the Orkney Science Festival, explains.

“Back in the late 1980s, Glasgow was beginning to overtake Edinburgh as a city of culture. When it was awarded European city of culture in 1990, there was a real feeling that Edinburgh needed to diversify its image... as a city of science, and Edinburgh City Council came up with the idea of a festival. With the arts festival at the end of the summer, they thought – at the beginning of the season, in the spring, there should be a science festival!”. Most importantly, this new idea held that it had to be fun, rather than ‘improving’.

“It was challenging because until then people had an idea of a ‘science fair’, something schools could do, and the idea of ‘science talks’. Science talks are ‘good for you’; but a festival is very different – something you pay for, that you enjoy, as much as you’d enjoy an arts festival, a drama festival, a music festival. The content has to be lively and enjoyable and aimed at the audience. So really, it was creating a new festival from scratch”.

Having made a success of the Edinburgh Science Festival, Howie took the concept even further north, to a rather unlikely location. “I have to confess, when it was first suggested that Orkney should have a science festival, I did stop and pause. Who on earth would come?” In many ways, however, the location is entirely appropriate. Not only is Orkney a beautiful destination, but it has long occupied a strategic position that has put it at the centre of scientific developments. An important part of the North Sea oil industry, it is fast becoming the focus for companies testing marine renewable energy technology, providing a home for EMEC, the European Marine Energy Centre.

“And of course, we had some of the first scientists anywhere. The stone circles and the chambered cairns with their entrances aligned to the setting sun at midwinter were all built by engineers, mathematicians and scientists



4-5000 years ago. Our ancestors were scientists, and the amount of scientific research that goes on now in Orkney is remarkable”.

Despite its remoteness, the Orkney Science Festival is currently thriving and, in its 20th year, is the second oldest (true) science festival in the world, drawing in audiences from across the world. The success of festivals like these relies on understanding that education comes second, entertainment first.

“The science is part of it, but you have to think of the people first. Our youngest audience member in Orkney this year is four, the oldest 93, and in each case they’re here because they enjoy it, because they have questions”.

Triangle of the forced

Rooted firmly in its historical beginnings, there is a sense that the British Science Festival has lost some of this sense of fun. This year’s festival, held at Aston University in Birmingham, was packed with events and variety, but hidden away in austere lecture theatres beyond labyrinthine corridors. And should the British Science Association come



Howie samples the Orcadian brew



to a decision between 'science' and 'entertainment', one feels that science would always win – however small the audience.

Meanwhile in Orkney, a bus tour that had very little to do with science drew in record crowds, who as well as sampling the produce at the local brewery (picture, left), learnt a little – but not too much – about how it is made, as well as the history of milling and brewing on the island.

"We try to make the transition seamless" says Howie. "The success of the bus tour was that it mixed people up – festival speakers with members of the public who may have had a lot of their own knowledge about farming, so everyone has something to contribute – no one is being lectured. And we blend that with very cutting edge science in some of the talks, like gravitational waves and marine renewables. That way, there's something for everyone".

There was 'something for everyone' in Aston too – topics ranging from earthquakes to economics to chemical engineering; but it was almost *too* much, lacking clear focus. The nebulous "theme" given to each Festival did not help. Among the most successful geological events was the field trip, which took visitors out of the University to see how science was applied to real life – in this case, to the limestone mines that cut deep into the land beneath Castle Hill in Dudley. Other events were rooted firmly in the lecture theatres and labs of Aston – for the lay visitor, not a welcoming environment, no matter how many posters led the way. And with up to 60 events running each day, the range of offerings was at times overwhelming.


Here, historical pedigree can be a hindrance. Every year has to be bigger, broader and encompass the whole of a world which is rapidly expanding. While in 1831, a few meetings might have covered most cutting-edge research, it might take months, even years, to do the same now. A festival without such a heritage is free to be more selective.

"One thing we're very emphatic about is quality" says Howie. 'I think a festival has a natural size, and it's better to work within the discipline of a fixed budget and explore those parameters, rather than trying to grow for growth's sake. It's lovely to start with a blank sheet every year and put together an exciting programme. We believe that if there's communication, particularly to young people, it's more important to get it right than to have a huge amount – that's why I'm so delighted that the Geological Society is developing workshops for young people and has come here to deliver them.

"One of the things we have to be careful about in communicating science is focusing not just on the known but on the *unknown* – the challenges. Just as we love detective stories or Sudoku problems, we want a challenge. It's important that science looks at the horizons and beyond them".

For a festival held on an island, this is a fitting motto. Like all island nations, the people of Orkney have learned to explore.

"Orkney is a crossroads – it was in the Neolithic, in the Norse period and later in two world wars, when the British Navy anchored here. This is an island community that has always looked outwards, whose people have always travelled distances and welcomed new ideas. So it does make sense to hold a festival of ideas and exploration here".

Location is just one of the many lessons the Orkney science festival can teach the rest. Another might be that, if they are really to be fun they would do well to adopt a concept familiar to anyone working in the arts: edit, edit edit. 

Coring for Ithaca

Adler deWind reports from the Greek island of Kefalonia on progress towards proving - or disproving - the theory that the Paliki Peninsula was once separated from the main island and was the true geographical location of Homer's Ithaca.

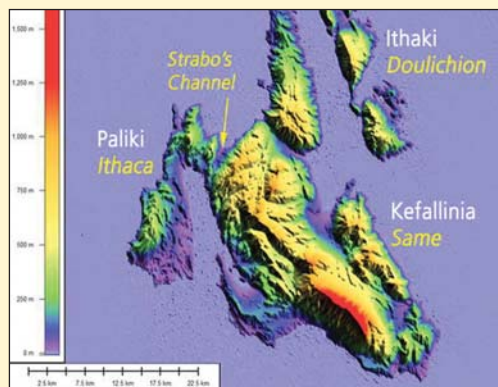


Fig.1: Digital Elevation Model (DEM) of Kefalonia showing the location of the Paliki peninsula and the Thinia Valley in which the boreholes are located. The yellow subscript gives the probable names of the respective islands if a marine seaway (originally described by Strabo) existed in Thinia 3000 years ago.



Fig.2: Oblique aerial shot of the Thinia valley, beneath which the marine channel separating Paliki from the rest of Kefalonia is believed to be buried. The valley is 6km long, up to 2km wide and rises to an elevation of c.180m at its saddle.



Fig.3: View south towards the Gulf of Livadi. The Livadi marsh (foreground) was the site of the first borehole sites and obtained over 80m of cores through the Holocene bay-fill sediments.

Despite a clear reference in Homer to “rocky Ithaca” being the westernmost, low-lying Ionian Island, controversy has long surrounded the location of Odysseus’s Homeland^{1,2}.

Three years after their initial support of the geoscientific investigation and work program into testing whether the western peninsula of Kefalonia (Paliki) could have been that free-standing island three millennia ago (Fig.1), geotechnical company Fugro are continuing their support of the project by drilling and coring boreholes in 15 locations. If successful, the coring program has the potential to settle the centuries-old classical Greek dispute^{3,4}.

While the selected borehole sites focus upon rockfall deposits in key areas in the Thinia Valley (Fig.2) through which the proposed ancient marine channel would have run, the locations also include others at Atheras Bay and Livadi marsh (Fig.3). The latter will sample estuarine bay-fill sediments and thus provide valuable new insights and understanding of the role that tectonics and climate had in modifying the effects of Holocene transgression in the most active part of the Hellenic arc-trench system.

Sedimentary cores are being acquired by Fugro Géotechnique, the company’s French affiliate, using a newly purchased Ecoforce CE-603 drilling rig (Fig.4). The rig was transported to Kefalonia on a 26-tonne truck and started its 85-day drilling campaign in September. The coring program is expected to run until mid January 2011. The drill sites have been selected by Prof John Underhill (University of Edinburgh), who is orchestrating the suite of geological, geophysical and geomorphic methods being deployed to test the theory in collaboration with Fugro Aperio. The program is being undertaken with permission and support of the Greek geological authorities (IGME), local political support from the municipal authorities and mayors of Argostoli and Lixouri, as well as the island’s Archaeological Ephorate of Prehistoric and Classical Antiquities and local landowners.



Fig.4: Fugro’s drilling rig on location at the southern Livadi Marsh, early October 2010.

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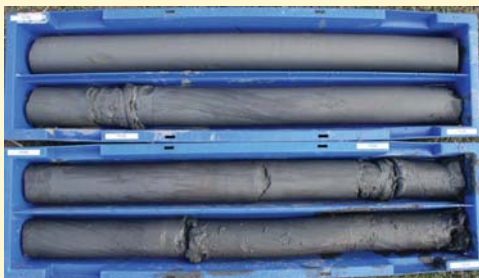



Fig. 5: Holocene estuarine bay-fill mudstone cores from one of the Livadi Marsh boreholes. Core boxes are 1m long.

Of the 15 sites, 13 will be continuously cored (Fig.5) and in total the project expects to collect around a kilometre of sediment. Those cores will be shipped to Fugro Robertson's dedicated core facility in North Wales, where they will be logged, sampled and analysed to reconstruct the depositional history and dated using biostratigraphy and radiocarbon methods.

As well as land coring, there is contingency for a marine coring campaign to supplement the onshore studies. If initial results of the land boreholes are encouraging, the project will use expertise from another Fugro affiliate, namely Falmouth-based Fugro Seacore. This company will provide a self-propelled barge to drill and core beneath the Gulf of Livadi and enable important calibration of the sediments detected by the project's 2007 seismic reflection survey³.

All being well, results of the new analyses should be available in late 2011, when it will become clearer whether the uncertainty concerning the site of ancient Ithaca has finally been laid to rest. 

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EDUCATION NEWS

School year!

Over the past year the Society's educational programmes have expanded hugely, with offerings for all ages, from our Primary School programme to life-long learning initiatives. Sarah Day reports.

Primary-age children are fascinated by the world we live in. By supporting *Rockwatch*, the club for young geologists, GSL encourages families to get involved with geology. We have also developed our own 'Rocks and Fossils' workshops, which over the past year has introduced over 400 primary age children to geology, with hands-on activities.

These workshops were launched as part of 'Darwin in London' – a project that brought together the various societies and organisations with which Charles Darwin was associated in London, and which was delivered to Westminster primary schools. The GSL even opened its doors to welcome classes of wide-eyed children (and staff!) to Burlington House. After a positive reception, it moved north to the Orkney Science Festival (see p.8), where over 200 children had the chance to take part. We also participated in the family day at Orkney, where children and families were able to find out more about geology and share their perspectives on landscape and history. As our education programme expands, we continue to work with Primary schools throughout the UK, offering teachers support and material to underpin their curriculum work.

Call in the SAS

Our outreach activities for older children have also gathered momentum this year with the introduction of the Schools Affiliate Scheme (SAS). This has enabled GSL to stay in touch with schools via bi-monthly newsletters, copies of *Geoscientist*, and news of events planned for next year. This has been very well received by schools teaching geology, and the programme will now be expanded to include schools who do not currently offer geology A level.

At the 2010 *Big Bang* festival, The GSL proudly celebrated A level student Tom Hearing's award as Young Scientist of the Year, for his project on the *Erosion of the Ammonite Pavements of Monmouth Beach*. Tom is currently a Junior Candidate Fellow of the GSL and we wish him every success for the future.

Thanks to help from BP, GSL ran its first *Geoscience Education Academy* (GEA) in August, with the aim of providing support to teachers without a background in the subject who nevertheless cover geology in schools. The Academy was a great success and enabled us to work with over 20 secondary school science teachers to develop ways of incorporating geoscience into their lessons – and pass their knowledge on to others. The next GEA will take place in August 2011.

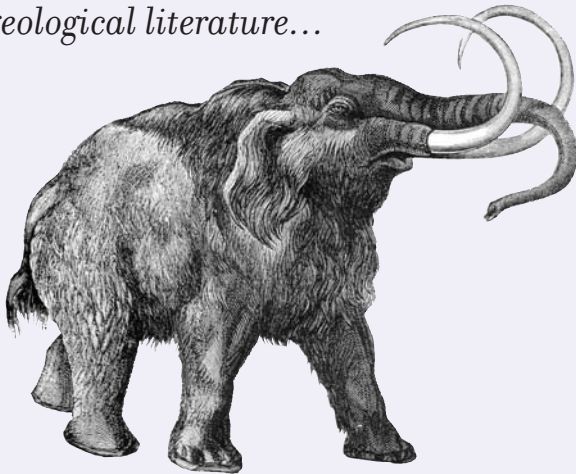
The *Friends of the Geological Society* scheme was launched in 2009 in response to the enthusiasm of interested amateurs attracted to the Society through our Shell Lecture series. There are now around 90 Friends, and after a successful evening event in July a second 'Friends only' evening is being planned for December. Friends receive a range of other benefits, including *Geoscientist*, a discount on the Special Publication book series, and a newsletter. Continued growth is expected in 2011!

The Friends scheme forms part of the Society's 'Lifelong Learning' activities, which will be targeted for development in the coming year. The operating and branding of the existing Endorsed Courses scheme will be reviewed and improved, and we hope that Friends will welcome the addition of a set of 'short courses' on a range of subjects. The emphasis on what we offer the geological enthusiast will be maintained, with the addition of extended information on Shell Lecture topics, delivered via the website. 



IN *Brief*

*Mats and flaps - Joe McCall
unearths more hidden gems from the
geological literature...*



Frozen mammoths

Kevin Campbell of the University of Manitoba has studied the blood of the extinct mammoth, using bacteria reprogrammed with 43,000 year old mammoth DNA¹. There were specific changes, adaptations from the blood of elephants, which allowed the mammoth to survive the most brutal Arctic ice-age winters. Mammoths originated in Africa and migrated through Western Europe and Siberia, across the Bering Strait to North America, then down towards South America². They originated 7.6-6.7 million years ago and migrated no earlier than two million years ago³. The last dwarf mammoths (two metres high instead of nearly three) died out – possibly as a result of human hunting) on Wrangel Island, Siberia only 3700 years ago². The mammoth possessed two adaptations in its blood, to make sure haemoglobin could release oxygen at low temperatures. Reindeer and musk oxen have such special adaptations to the cold too, but they are different.

Mammoth remains are frequently dug up in the Upper Thames gravels which form four terraces close to my home in the Cotswolds. These deposits of ice-sheet outwash were deposited in tundra conditions. I am a little worried by the suggestion that other features of mammoths are similar adaptations to that of the blood³. Claudine Cohen's excellent book² on mammoths seems to suggest that there exists general agreement with Depéret and Mayet (1923)⁴, who argued that the conclusion (by Gaudry and

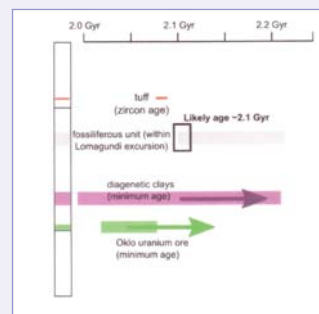
other Darwinian palaeontologists) that 'normal mammoths acquired fur by migrating to a colder climate' is wrong. Depéret and Mayet concluded that hairless mammoths would have died from cold or quickly migrated southwards again. The Beresovka Mammoth, excavated north of Magadan in 1901², also possessed an anal flap, which would have prevented it from passing frozen faeces, presumably a rather painful process; and the same was found in a baby mammoth excavated in 1977 in the same region.

Did the mammoths of Africa have furry coats (many African mammals do still)? Was the furry coat an adaptation to the cold or were the original mammoths of Africa already fur-coated and therefore pre-adapted? The anal flap is an obvious advantage in the extreme cold, but was there enough time during the migration of mammoths through Western Europe (where it was certainly very cold at that time) to Siberia, for natural selection to operate? Natural selection would surely work on an occasional mutation that developed selective advantage in the changed conditions. The blood adaptation does not worry me, but I am unsure about both the fur and flaps. It seems to be too easy to refer all these features to adaptation when the mammoths migrated to the frozen north.

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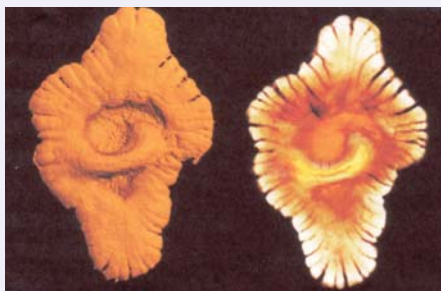
The first eukaryotes



I have been looking into the question of the fossil evidence for eukaryote protists first appearing on Earth, after the initial period from ~3800Ma when the first protozoa (cyanobacteria) were the sole life forms and by photosynthesis gave rise to the oxygenic atmosphere. My search was related to an article that I am

writing entitled 'Are we alone? The evolution factor in the context of the exoplanet-proliferated universe' which I intend to aim for the meeting of the Meteoritical Society in Greenwich in 2011. I concluded, on reading the literature, that:


"There is no agreement among scientists as to when exactly unicellular eukaryote protists, with organelles developed: 3200Ma, 2300Ma, 1200Ma and even 900Ma have been suggested: some unicellular protists occasionally developed multicellular forms, and multicellular life seems to have developed from them (the kingdoms of animals, plants and fungi): protists adopted both asexual and sexual reproduction, and the latter required the initiation of DNA etc., a complex mechanism with the double



helix, but there seems to be no evidence as to exactly at what time in the geological record this happened".

Coincidentally there has now been a discovery in Franceville, SE Gabon, in rocks of the Francevillian Group, which are confidently dated at 2.1Ga.

There is confirmation from a known ^{13}C excursion, the Lomagundi excursion. The flattened dish-like fossils are found within a black shale unit, in a marine delta environment following a rapid burial event. Sulphate-reducing bacteria decomposed them to pyrite, leaving a durable mineralised impression¹. About 250 fossils 10-120 mm long were recovered. Though they could be a bacterial mat, the authors of the article describing them, Albani *et al.*², used high resolution X-ray tomographic scans to reveal complex internal 3-D structure. They say that they are not bacterial colonies – they do not know of any other colony in the Precambrian fossil bacteria. These organisms are almost certainly multicellular eukaryotes – i.e., possessing organelles and DNA. They are believed to have lived in the sea 20-30m down and breathed oxygen. If this identification is correct, and evidence of steranes, chemical biomarkers of eukaryotes, was obtained supporting this identification, they appeared long before the first filamentous algae (eukaryotes) at 1.6Ga. They post-dated the Great Oxidation event at 2.4Ga, so could readily obtain oxygen.

This discovery is obviously of critical significance. The fossil record prior to the Ediacara soft bodied fossils⁴ (Neoproterozoic, ~600Ma onwards just into the Cambrian) is so patchy that any discovery of fossils in the earlier Proterozoic rocks is important. 

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HEN picked

The Society, together with the GEES (Geography, Earth and Environmental Sciences) Subject Centre, are holding an interactive one day meeting on 'Geoscience Graduates for the 21st Century', which will include presentations, demonstrations, posters, workshops and discussions, to share research and best practice on learning and teaching in the geosciences at university level. This event will also mark the launch of the new Higher Education Network (HEN) of the Geological Society, which is being formed to provide support to those working as teachers and researchers in academia. To find out more, visit www.gees.ac.uk/events/2011/earthsci11/earthsci11.htm.

Nic Bilham

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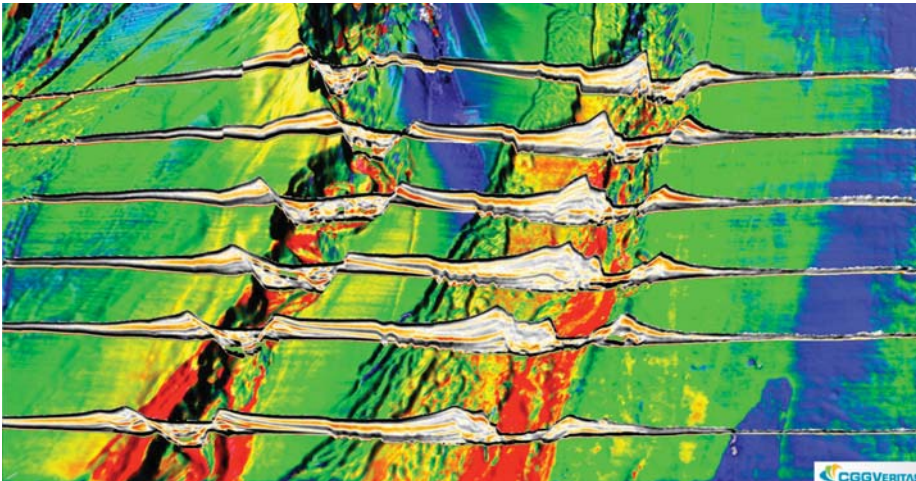
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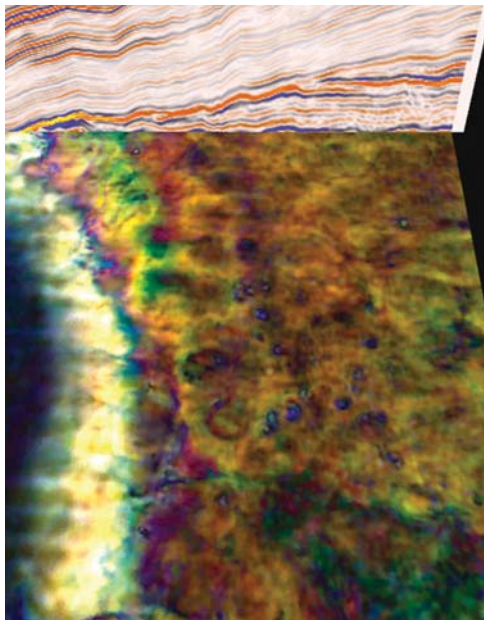
Frontiers of seismic geomorphology

Rob Butler reports on one of Earth science's most rapidly developing new*



Amplitudes displayed on a seismic surface to reveal submarine channels, cut with a set of profiles showing the geometry of channel-related deposits. The image comes from the eastern Gulf of Mexico, by Zoltan Sylvester, courtesy of CGG Veritas, Shell and the Virtual Seismic Atlas.

Spectral decomposition reveals sink holes and cave chambers - part of a palaeokarst in Permian carbonates shrouded beneath Triassic and younger sediments, Norwegian Barents Sea. Image courtesy of Dave Hunt, Statoil and the Virtual Seismic Atlas.



shown how coeval depositional environments pass from one to another, and vertical sections chart changes through time, until rather recently, much of this 4D stratigraphy has been hypothetical and poorly constrained. Analysis of 3D seismic data has changed all that – spawning the new science of seismic geomorphology.

Three-D seismic of course improves on simple bathymetry by probing inside ancient landscapes – both on and offshore; for example, imaging the internal structure of slumps and old cave systems, or linking submarine morphology to underlying tectonic structures. Seismic geomorphology is used by oil companies to provide analogues for deeper, less-well-imaged reservoirs – the better to plan hydrocarbon recovery, give notice of potential drilling hazards and, in future, maximising

underground carbon-storage security. It also reveals the history of submarine slope failure, the better to evaluate tsunami risk.

But these images also open up new opportunities for fundamental stratigraphic research – charting how the near-surface of the Earth has evolved through geological time. To date, most investigations have concentrated on using the relatively shallow parts of seismic data-sets, chiefly collected at sea, where signal quality is high. But increasingly, the combination of better acquisition and initial processing of seismic is allowing interpreters to use land-based data and deeper parts of the section. The effect is greatly to increase the reach of seismic geomorphological studies both in space, and back into deep time.

Much of the new imagery used in seismic geomorphology relies on imaginative use of seismic attribute mapping, ways of extracting information beyond the standard amplitude displays. Commonly, the first step in interpretation is carefully to pick out an individual seismic horizon – defining a single time-equivalent level that can be investigated. Sometimes, abrupt but short-range gradient changes on this horizon (the dip-attribute) alone can bring out features such as channel margins. But further information can be added by quantifying seismic amplitude variations along individual horizons. These variations are calculated automatically and draped over the mapped horizon. Amplitude attributes can predict sandy channel-filling sediment that

Tidal channels, patch reefs, deep ravines, slump scars, sand waves and sediment fans are just a few of the structures imaged on the modern sea bed. Over the past 50 years, detailed seabed maps have gradually revolutionised how we view processes under the waves. The challenge has been to take these modern insights back into the geological record.

Although a very few spectacular outcrops have

geomorphology

techniques.

might represent a potential hydrocarbon reservoir, and underpins many commercially available facies-mapping tools.

Much greater resolution is now available to interpreters through spectral decomposition, which uses the range of frequency content in seismic data. Careful frequency tuning can pick out further small discontinuities and heterogeneities within units – and their forms interpreted in terms of landscape features. The methods have moved far in the past decade, but new tools and approaches are being developed all the time – this is still a rapidly-developing area of Earth science.

In the vanguard of the science of seismic geomorphology stands Henry Posamentier, the Society's 2010 William Smith medallist. Coinciding with the presentation of his medal, the Petroleum Group, in partnership with the Virtual Seismic Atlas, ran a meeting to showcase the exciting new imagery and the geology it inspires.


Frontiers of Seismic Geomorphology was held at Burlington House on June 1. Henry gave the keynote talk – with a supporting cast drawn from industry and academia. Collectively, they gave a masterclass in modern seismic interpretation for environments spanning the deep ocean to near-shore – and even to the foothills of the Canadian cordillera. Topics included mapping out submarine and fluvial channels and submarine landslides, through to linking faults in the subsurface to structures visible on seabed. Studies of ice-sheet dynamics are informed by tracking out the extent of ancient, originally sub-glacial, channel systems. New image-enhancement techniques can now detect ancient cave-systems in the subsurface, and the

history and extent of flow packages that constitute thick sequences of flood basalt. Many of these new applications have yet to appear in print – they are true frontiers in seismic technology and geological interpretation.

Of course, original data required for seismic geomorphology come from the hydrocarbon sector – the only community to collect significant volumes of 3D seismic. This means that while industry now routinely uses these images, the new science has had rather restricted reach beyond the specialist literature and industry-facing conferences. You would be hard-pushed to find seismic geomorphology images in stratigraphy textbooks or undergraduate geology programmes.

Consequently, a chief aim of the meeting was to create a collection of dramatic images accessible to the widest audience. Preliminary output from the meeting is now live on the Virtual Seismic Atlas website, www.seismicatlas.org (to short-cut, type “Frontiers” in the VSA search box). This resource is freely accessible for teaching and training. Leading the way is a collection from Henry Posamentier that includes patch reefs and tidal channels, mass transport complexes and submarine channel-levee systems.

Submarine channels also feature in a stunning series provided by Shell's Zoltan Sylvester from the eastern Gulf of Mexico. Dave Hunt of Statoil illustrates how spectral decomposition can resolve the extent of some Palaeozoic cave systems in part of the Barents Sea. Nearer home, Jenny Collier of Imperial College integrates seabed near-shore bathymetry with 2D seismic data to resolve the continuity of basin inversion structures off the Dorset coast. In coming months this collection will be expanded to include further geological settings and additional interpretative approaches.

Background reading and case studies are available in several GSL publications available through the Lyell Collection (e.g. Memoir 29, Special Publication 277). 

Acknowledgments

Thanks go to my co-convenors Bill McCaffrey (Leeds) and Russell Wynn (Southampton), together with sponsors, Chevron, BP and Statoil.

* Dr Rob Butler is in the School of Geosciences, University of Aberdeen.



Geoengineering – an experiment too far?

Peter Hurrell reports on a NERC-sponsored public dialogue, which investigated how members of the public formed their ideas about the controversial idea of mitigating climate change by direct intervention.*

Phytoplankton bloom. One proposed geoengineering scheme envisages seeding them with iron to encourage their growth.

Our climate is changing, and man-made emissions of greenhouse gases are probably to blame. But what can we do about it? Maybe, as some scientists suggest, geoengineering can provide the answer. However, deliberately altering our environment is a controversial idea. Earlier this year, before any policy decisions are made, the Natural Environment Research Council (NERC) and Sciencewise-Expert Resource Centre (SERC) sponsored a public dialogue to find out what people really think about geoengineering.

A public dialogue is a good way to find out what people think about an unfamiliar subject, and how they form their opinions. It allows the organisers to introduce a relatively small number of participants to some complex ideas, and a variety of conflicting viewpoints. As new ideas are introduced, participants' viewpoints may change, and a dialogue can help us understand what causes those changes, and what principles people use when forming their opinions. Geoengineering was an ideal subject for this treatment. It is a complex, potentially contentious new research area that could directly affect people's lives and the environment – although few have ever heard of it.

The dialogue consisted of a series of workshops in Birmingham, Cardiff and Cornwall. In each location, we invited 30 people to attend two day-long workshops, held one week apart, to give the participants a chance to think about what they had heard and to discuss it with friends and family.

At the first workshop, participants learned about nine potential geoengineering technologies, from planting trees to injecting sulphate particles into the atmosphere or fertilising the ocean with iron. They had the chance to discuss the technologies with the scientists who also attended the workshops. The second workshop introduced participants to some of the ethical, legal and societal issues that could arise if geoengineering were ever deployed.

We also ran discussion groups for young people in Birmingham, and for people at risk of flooding in Cardiff. Science centres in Birmingham, Cardiff and Oxford held open access events, and we conducted an online survey to give as many people as possible the chance to comment.

So what did we find? None of the participants objected to the idea of geoengineering in principle, but they wanted answers to a number of questions before any geoengineering took place. They wanted scientists to have a better understanding of potential side-effects. "We've already wrecked the atmosphere; we don't want to wreck the ocean too" said one participant from Birmingham. Many wanted to know whether we could reverse the effects of the geoengineering technologies if required, and whether the benefits of deploying the technologies would outweigh the carbon, financial and environmental costs.

Participants tended to like schemes designed to remove CO₂ from the atmosphere more than ideas designed to reduce global temperatures by reflecting sunlight back into space. This was summarised by one participant; "The solar management options might help cool the planet down but they don't help solve the problem of taking away the carbon dioxide."

However, participants also thought that no single solution would be enough to tackle climate change, and that geoengineering should be associated

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with efforts to reduce carbon emissions. Said one Cardiff participant: "We should do both – mitigate, and use the geoengineering system. People still need to remember to cut CO₂".

"Naturalness" good

Another important principle for participants was that of 'naturalness'. Geoengineering ideas that replicate processes already found in nature were preferred. Afforestation and biochar, both seen as 'natural', were favoured over technologies seen as interfering in complex natural systems – such as iron ocean fertilisation. Commenting on afforestation through the online survey, one contributor said: "We are balancing the environment rather than unbalancing it with flawed technology." Cloud whitening was the favourite solar radiation management idea as it mimicked natural cloud formation processes – although it was not generally a popular option.

Participants also recognised the global scale of the problem, and of any potential solutions. "We should not be making choices for developing countries. They should be involved in making the decision" said one participant from Cornwall. Participants felt that they would like more public engagement as scientists learn more about the geoengineering options available, and that any future dialogue should include people (including scientists) from around the world. They also felt that geoengineering decisions should be taken by scientists, as the public do not have enough information to make an informed choice.

Results

Early results from the dialogue workshops have already informed research proposals stemming from a 'sandpit' event on geoengineering, organised by the Engineering and Physical Sciences Research Council (EPSRC), with co-funding from NERC. The dialogue also contained several lessons for anyone interested in communicating with the public about climate science, and these are being used by the Living With Environmental Change partnership.

NERC will use the results of the dialogue when considering future strategic priorities. Policy-makers and Non Governmental Organisations (NGOs) were involved throughout the dialogue process to ensure that the results will be useful to others with an interest in geoengineering research or deployment.

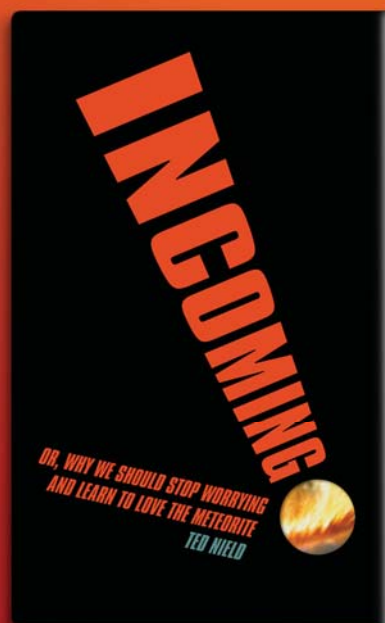
We would encourage anyone with an interest in geoengineering to take a look at the dialogue report and think about how the public's views on geoengineering can inform your work.

The full report and a summary leaflet can be downloaded from the NERC website at:

www.nerc.ac.uk/about/consult/geoengineering.asp

* Peter Hurrell is Stakeholder Liaison Officer, KE Policy and Partnerships Team at the Natural Environment Research Council (NERC). E: perr@nerc.ac.uk

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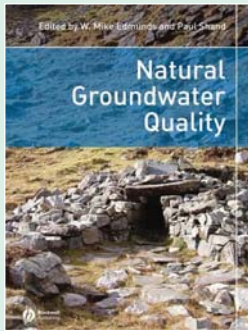
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Reviews

Copies available for review:

-  Foulger, G.R. (2010), *Plates vs Plumes: A geological controversy*, Wiley-Blackwell.
-  Siggins, L. (2010), *Once Upon a Time in the West: The Corrib Gas Controversy*, Transworld Ireland.
-  Wheater, H., Mathias, S. & Li, X. (2010), *Groundwater Modelling in Arid and Semi-Arid Areas*, Cambridge.

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The Water Framework Directive (WFD) and Groundwater Directive require us to describe the natural background water quality of European aquifers. But what is natural groundwater quality? Is there even such a thing? Humankind has globally altered the chemistry of groundwater recharge for millennia - from Palaeolithic deforestation to atmospheric hydrogen bomb testing. Happily this book does clarify this conundrum. Its aim is to present a pan-European methodology to determine natural groundwater quality. Against this, future trends of improving or deteriorating water quality can be identified, for the WFD, with consistency across the EU.

This is a well-produced book with many detailed, clear figures. It is not a textbook on aqueous chemistry, although the introductory chapters have plenty of references to more quantitative texts. (The introduction is, in my opinion, a very readable digest of groundwater chemistry principles). The book comprises two sections. First is a set of nine chapters on the characterisation of natural groundwater quality. Introductory chapters summarise the chemical processes that affect groundwater composition along flow lines. These are followed by descriptions of using numerical modelling and tracers (natural and anthropogenic) to quantify chemical processes, and to determine and interpret groundwater ages. Further chapters focus on requirements for monitoring, and statistical analyses in support of WFD assessments.

Twelve case studies of European aquifers follow including, as the only UK case, the Dorset Chalk aquifer. Each case study demonstrates the use of analytical and statistical tools described in earlier sections. There are tables of statistics in most chapters, but the value in these studies is in the application of the chemical data collated. None of the analysis techniques presented is novel, but this is a good compilation of available methods for illustrating, or reinforcing, hydrogeological conceptual models. For me, it is a shame that there is only one case study from the UK; however, most UK aquifers are covered in the baseline series of BGS/Environment Agency reports.

Use of chemical data is a powerful method for gaining understanding of flow processes within aquifers. Although not the first to do so, this book presents sufficient background, techniques and examples for this type of understanding to be readily obtained. It will serve its purpose well - of informing WFD assessments of natural background quality. But it will also be useful as an aid, and example, for interpreting regional-scale hydrogeology using data on groundwater chemistry.

Steve Buss

ESI Ltd, Shrewsbury



Climate Forcing of Geological and Geomorphological Hazards

Themed Issue (Vol.368) of Philosophical Transactions of the Royal Society (A)

W McGuire, R Betts, C Kilburn, M Maslin, D Pyle, J Smellie & D Tappin (eds)

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sales@portland-services.com

This publication followed the Third Johnston-Lavis Colloquium held at University College London in September 2009. Twelve research papers are included in the collection looking at potential lithospheric responses to climate change. This is an unusual perspective on the issues surrounding climate change, focusing on a plausible set of lithospheric impacts that could arise from anthropogenic climate change – all assuming that the generally accepted “scientific consensus” of a 2°C to 4°C rise in global temperature occurs in the foreseeable future.

The papers can be classified as presenting evidence with respect to general concepts (x2 papers), methane hydrate feedbacks (x2), tsunamis triggered by submarine slope failures (x1), mass wasting processes on land and slope instability (x2), seismicity (x2) and volcanism (x3). It would be unfair to label these as “worst case” scenarios – as they start out from what appears to be the current received position. Individually the processes described are entirely plausible, some with

fascinating case histories as evidence (Huggel *et al* on Mt Cook and McGuire describing the Kolka glacier failure are particularly interesting), but for this reviewer the collection lacks credibility as a whole.

Anyone who deals with failure analyses in Earth systems, and in geotechnical and geomorphological processes in particular, will understand how difficult it is to pin down cause and effect in complex systems. Slopes, for example, fail due to a particular combination of events acting at a particular time, and whilst it is frequently the case that in engineering systems at least it is often relatively easy to isolate a change (e.g. in ground water conditions, due perhaps to a blocked drain or a particularly intense rainfall event), in natural slope failures such deterministic conclusions are far less easily made.

If it is accepted that the scientific method comprises the formulation of a hypothesis, followed by its rigorous testing under controlled conditions, this collection of papers is only dealing with one part of that method. These are in effect a collection of hypotheses, which effectively appear to be untestable. That, of course, is not the fault of the many authors involved in producing this collection, but it is a fundamental problem with events that occur within geological rather than human time frames. Gaia's revenge, if and when she sees fit to serve it, will be the coldest of cold dishes, and it is doubtful that anyone likely to read this volume will ever be in a position to confirm these hypotheses by direct observation.

There is plenty of evidence here for those that wish to paint a picture of how bad things could be, and given recent events like the Boxing Day tsunami, the Haitian earthquake and Chinese landslides, one could read this book and start seeing visions of the Horsemen of the Apocalypse. Indeed the description presented in the book of the volcanic risks associated with Iceland seems at times to be most prescient.

The collection offers interesting base material for those teaching Earth hazards and risks, and will enable students to see beyond standard course materials. The collection as a whole raises far more questions than it answers however. This point is not lost on the authors themselves, and is covered by an interesting discussion on volcanism and climate change. Whether or not the solution to this problem advocated in the conclusion (i.e. more modelling) will ever provide us with more answers than questions is a point on which I remain to be convinced.

Keith Nicholls

Letters

Geoscientist welcomes readers' letters, and every effort is made to publish them as promptly as possible. You can help by keeping letters to around 300 words or fewer. Please write to **Dr Ted Nield**, Editor, at The Geological Society, Burlington House, Piccadilly, London W1J 0BG or email ted.nield@geolsoc.org.uk.

All letters are published at www.geolsoc.org.uk/letters, and a selection subsequently presented in the magazine. Please note that letters may be edited.

Words of Ward

From Joe Brannan (Pub'd 1 November 2010)

Sir, Bob Ward thinks I gave Andrew Montford's *'The Hockey Stick Illusion'* an easy ride because I am sympathetic to his views. Not so. I commended the book because I found its arguments clear and convincing. I cannot say the same of Bob's riposte. Two examples: First, Bob asks why I failed to mention the 'detailed rebuttals' of McIntyre's critique in my review. Answer: I didn't mention them because Montford discusses them *ad nauseam* in the book (*Chapter 10 – Zone Defense*). He shows that these rebuttals rely on much the same contested data as Mann's original paper and, as a result, suffer from the same shortcomings. But don't take my word for it – read the book and make up your own mind.

Second, Bob states that the US National Academy of Science Committee found Mann's 'overall conclusions to be plausible'. Well, up to a point, Lord Copper. Apart from the fact that plausibility is hardly a robust scientific test, there is a lot more to this particular episode. There were in fact two committees; the second, led by the eminent statistician Edward Wegman, concluded that "Overall our committee believes that Mann's assessments that the decade of the 1990s was the hottest decade of the millennium and that 1998 was the hottest year cannot be supported by his analysis"¹. In subsequent hearings the head of the NAS committee, Gerald North, was asked if he demurred from this opinion – he replied "We don't disagree with their criticism, in fact it's pretty much the same thing is said in our report". Again, don't take my word for any of this – go to the original sources and check for yourselves.

Bob notes that I am sympathetic to the sceptics. I am, but in a very specific sense; I believe that critics such as McIntyre have raised legitimate questions about the robustness of the Hockey Stick. They deserve a straight answer. Judith Curry, the only mainstream climatologist to review the book (as far as I am aware) agrees with me².

The hypothesis that recent global temperatures are unprecedented in 1000 years is profoundly important. We should be gathering data by the bucket-load to test it, instead of endlessly debating the meaning of the inadequate data-sets we have amassed to date. I have no doubt that the hypothesis can be conclusively tested, and I look forward to the result – regardless of whether it turns out to be true or false.

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- http://climateaudit.files.wordpress.com/2007/11/07142006_wegman_report.pdf <http://judithcurry.com/2010/09/25/climate-book-shelf/>

Geo-collaboration on the Weymouth Relief Road

Dorset County Council, through their Jurassic Coast Team, has recruited a stellar cast of well-known UK geologists to record the geology along the Weymouth Relief Road. Jamie Codd reports.*



View looking south from the Ridgeway chalk cutting

The Weymouth Relief Road is an £87.4 million single carriageway road designed to remove traffic from built-up areas and reduce journey times between Dorchester and Weymouth. The road will also improve access to Dorset's Jurassic Coast World Heritage Site. The new 7.5km road passes through a sequence of strata dating back to the Middle Jurassic, 160 million years ago. Its construction created a temporary window of opportunity to study and record rocks and important structures normally only seen on the coast.

Dorset County Council, Skanska Civil Engineering and Amey Consulting have raced against time to ensure that stratigraphers, structural geologists and palaeontologists witness the exposures before they were covered. Plans have also been drawn up to preserve some important exposures for future generations of geologists.

Progress on the scheme has been extremely rapid since March 2009 when Walters (UK), the earthworks sub-contractor, commenced the one million cubic metres of earthworks. Aided by dry weather and closely monitored by Amey's engineers, Skanska

and Walters have worked seven days a week at the northern end of the scheme to carve chalk from Ridgeway Hill and build a 23m-high embankment across the valley at Bincombe.

Working southwards, the rolling Dorset landscape has demanded substantial cuttings. These, combined with excavations for retaining walls and other structures, have provided a complete sequence of inclined Portland Stone, Portland Sand, Kimmeridge Clay, Corallian Beds and Oxford Clay. Deep foundations for bridges top and tail this extensive Jurassic sequence, revealing the Purbeck Group and lowermost Oxford Clay, respectively.

With work proceeding rapidly, and with site safety a prime consideration, access to key exposures has often been limited to short breaks during construction. However, renowned specialists have been called on, sometimes at short notice, to help Amey's geologists interpret and record what has been found before foundations are filled with concrete and slopes are topsoiled. Regrettably however, there has been little opportunity to accommodate visits by large parties or fossil collectors.



Excavation in progress in the cutting at Southdown Ridge



Excavation in progress at Ridgeway



Jurassic Coast

The Weymouth Relief Road traverses the same strata found along the classic Dorset coastline (the "Jurassic Coast"), England's only natural World Heritage Site. The Jurassic Coast stretches 150km from Exmouth in East Devon to Old Harry Rocks near Studland Bay in Dorset, recording over 185 million years of the Earth's history.

At an early stage, the County Council's planners and Richard Edmonds (Earth Science Manager, Jurassic Coast) realised that the proposed road might provide more continuous sequences of some strata than can be seen on the coast. Therefore, planning conditions included special requirements for recording the geology and, where possible, preserving sites to display the inland geology.

The construction team have been retaining fossils and other samples of geological interest discovered during the works. Recognised experts have been invited to inspect temporary exposures, log the stratigraphy, identify fossils collected and help build a more accurate geological map of the road. Specimens will eventually go to a local museum.

Chalk

Chalk specialist Prof Rory Mortimore has undertaken several inspections of the chalk exposures at the Ridgeway. His finds (of echinoids, crinoids and bivalves) have allowed him to refine the stratigraphy of the Chalk in the area.

Close to the Ridgeway and Abbotsbury Fault complex, the chalk bedding is almost vertical, so much of the sequence is exposed over a short distance. Several regional marker horizons have been fixed, including the Lewes Marl and associated tubular flints in the Lewes Nodular Chalk Formation. The discovery of beds containing the bivalve *Platyceramus platini* has confirmed the presence of the Belle Tout Beds at the base of the Seaford Chalk Formation and fragments of the crinoid *Marsupites testudinarius* indicate the Splash Point Beds at the base of the Newhaven Chalk Formation and the Old Nore Beds higher up the sequence.

SAXON/VIKING ARCHAEOLOGY, RIDGEWAY HILL

During May 2009, archaeologists uncovered a burial pit containing 51 skulls and randomly placed skeletons. The remains were discovered in a buried chalk quarry at Ridgeway Hill.



Archaeologists investigate a mass grave at Ridgeway Hill

The remains have undergone a detailed analysis by Oxford Archaeology. They were found to be tall, robust males, mostly aged from late teens and mid twenties. A few older individuals were also found in their number. Some of the skulls show signs of multiple blows to vertebrae and jaws with sharp weaponry like a sword, suggesting a possible execution. Signs suggest that they were naked when thrown into the pit. Radiocarbon dating has been used to date the remains to between AD890 and 1030, the late Saxon period.

Rory Mortimore inspects slickensides along a fault at the Ridgeway.



Micraster coranguinum from the Seaford Chalk Formation.

Rory Mortimore records the positions of three steeply dipping flint bands in the Seaford Chalk Formation



View north towards Chalk cutting at Ridgeway, Purbeck Beds in the foreground. An outcrop of Oxford Clay runs east-west between the two.



Purbeck Beds exposed in an excavation for the northern foundation of the arch bridge at Bincombe.



The first components of the arch are raised into position.



Richard Edmonds of the Jurassic Coast Team takes "Gigapan" photographs of the Purbeck strata.



Purbeck Beds

Complex faulting at the Ridgeway has brought up a thin slice of Oxford Clay into contact with the Chalk and the steeply dipping Wealden and Purbeck Beds. The geology here, first described in remarkable detail by the Rev. Osmond Fisher² in the 19th Century, has long been of interest to Dr Ian West. In a series of visits to a fine, but temporary exposures in the Purbeck Beds at Bincombe Lane, he has confirmed the remarkable observational powers and recording skills of geological pioneers such as Fisher (who wrote the first English textbook of geophysics). Excellent descriptions of the geology exposed at Bincombe and elsewhere along the scheme can be found on Dr.West's award-winning website¹.

Dr Bill Wimbledon has taken samples for palynological study and further investigation of the Jurassic-Cretaceous boundary which, remarkably, lies within the footprint of a new arch bridge. He has previously studied the upper part of the Purbeck succession in the nearby Upwey Quarries and Bincombe Down Site of Special Scientific Interest.

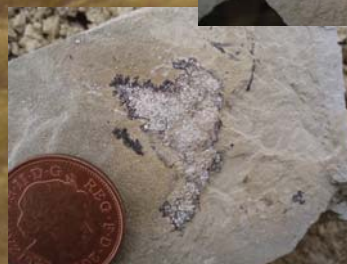
Mark Woods of the British Geological Survey has visited the site to update their records and compare the strata with the Durlston and Lulworth Formations recorded elsewhere³.

Purbeck Beds exposed in the excavations and in adjacent Upwey Quarries differ from those exposed at Lulworth and Durlston Bay because they were deposited closer to land. As a result the beds contain terrigenous material including plant, vertebrate and insect fossils.

Discoveries have included fossilised coniferous branches and pinnules, some of which have been sent to the University of Leeds for analysis by Prof Jane Francis. Bulk samples from fossil soils (dirt beds) have been passed to Paul Ensom, formerly of the Dorchester Museum, and have been found to contain micro-vertebrate remains. Drs Rob Coram and Ed Jarzembowski have both visited the Purbeck exposure at Bincombe to search for fossilised insects. They readily located the Upper and Lower Insect Beds, first noted by Osmond Fisher, and discovered an array of finely preserved insects including Trichoptera (caddisflies), Neuroptera (lacewings), Coleoptera (beetles), Orthoptera (grasshoppers and crickets), and Odonata (dragonflies and damselflies). Other fossils discovered in the Purbeck strata include fish scales, bones and teeth.

Although not part of the works, a trench was excavated by Skanska and Walters at Bincombe, to investigate the boundary between the Purbeck Beds and the underlying Portland Stone Formation. This temporary excavation successfully exposed the boundary, but unfortunately the famous "fossilised forest" (stromatolites) exposed at Lulworth were absent.

Plant, beetle and ostracod fossils from the Lower Insect Bed



Portland Group

The Portland Stone Formation was exposed in a cutting south of Bincombe and the contractors managed to save a number of the huge ammonites for which Portland is so famous. The ammonites are of the genus *Titanites* and specimens up to half a metre in diameter were recovered. Several smaller ammonites, bivalves and marine gastropods were also recovered. South of the cutting, the Portland Sand Formation was exposed, faulted against the Portland Stone and revealing pockets of Portland Clay.

Kimmeridge Clay

Continuing south, the cutting passes into the Kimmeridge Clay, a formation of particular interest to Dr Ramues Gallois (formerly of BGS). The Formation typically comprises organic rich silty mudstones with bands of thin siltstones and limestones.

Although excavations in the Kimmeridge Clay were relatively shallow, compared to the cuttings further north, site visits have proved very productive, yielding bands of septarian nodules, coccolith-rich limestones, organic rich horizons and the finely detailed crinoid, *Saccacoma*, preserved in pyrite. Many familiar marker bands were identified, including the Encombe Stone Band, Freshwater Steps Stone Band, the Middle White Stone Band and the Blackstone Member. On one occasion, a bone thought to be part of the rostrum of an ichthyosaur.

Excavations for balancing ponds exposed numerous beds of oil shale together with a very distinctive weathered mudstone bed. This was weakly cemented and contained clay casts of many ammonites and bivalves, a distinctly different form of preservation from those in adjacent beds. Of particular interest was the variation in size of different ammonites of the same genus, representing a range in ammonite maturity.

Corallian Group

The relief road cuts through a prominent east-west ridge (the Southdown Ridge), revealing an almost uninterrupted section through most of the Corallian Group. Ian West, John Wright and Kevin Page have helped interpret this section which, freshly cut by excavators, can appear quite different from the weathered coastal exposures. Sedimentary structures and other features that may be on a coastal cliff may not be immediately apparent in a machine-created pit or wall.



Aerial photograph showing the distinctive colours of the Corallian of Southdown Ridge. (Photograph by Still Imaging)

A large ammonite, *Titanites* sp., emerges from excavations in the Portland Stone Formation (photograph by Richard Edmonds)



A large ammonite, *Titanites* sp., recovered and stored by Skanska's construction staff (photo: Duncan Codd)



A large septarian nodule from the Kimmeridge Clay, split to reveal elaborate fracturing



A trial ledge is excavated in the Clavellata Formation of the cutting at Southdown Ridge



Although most of the Sandsfoot Formation is absent, the junction between the Corallian and overlying Kimmeridge Clay, marked by the Ringstead Waxy Clay, was briefly exposed in the excavation for a culvert north of the ridge. The Clavellata Formation, characterised by the abundance of the bivalve *Trigonia clavellata*, is the most resistant of the Corallian strata at the north end of the cutting. Many fossils were found here including rare ammonites, a large nautilus and an ichthyosaur vertebra.

Beneath the Clavellata Formation lies the Osmington Oolite Formation, typically oolitic and bioclastic limestones with interbedded oolitic and pisolitic calcareous mudstones and clays. The distinct colour contrast between the white and light grey limestones and the dark grey argillaceous material makes the oolitic marker horizons relatively easy to pick out, compared to the beds of the Clavellata Formation. The ooids are usually up to about 5mm in diameter, or medium to coarse sand-size, and have a concentric structure. A well timed site visit found a horizon with many fine examples of the small echinoid, *Nucleolites scutatus*, less than 2cm across and 1cm tall.

Several faults occur in the Southdown Ridge, leading to variations in dip and repetition of some beds, including the Benclyff Grit. This marks the base of the Osmington Oolite Formation and the top of the Nothe Formation. The horizon is sometimes identified by the occurrence of hard cannonball-like sandstone concretions. However, where these had not been crushed by machinery, they seemed to have taken on a more tabular form than elsewhere.



Ammonite macroconch (above) and microconch (below) showing differing development of ornamentation



The Benclyff Grit at Southdown Ridge is most easily identified by its distinctive colour, a bright orangey or reddish brown, caused by oxidation of iron. Similar to the Benclyff Grit is the Preston Grit. The two are separated by the Nothe Clay, though little of this has been exposed along the road to date. The Preston Grit can be distinguished by the occurrence of the bivalve *Gryphaea dilatata*. The bivalve also characterises the underlying Oxford Clay to the south.


Oxford Clay

Earthworks last autumn have been concentrated at the southern end of the scheme, close to the axis of the Weymouth Anticline. These uncovered a partially faulted boundary between the Nothe Formation and the Oxford Clay.

Where the boundary is conformable the Bowleaze Clays, at the top of the formation, have been identified by the occurrence of bands of distinctive, red siderite nodules within the pale grey clay. The Oxford Clay is typically iron-rich, thanks to the anaerobic conditions under which the strata were deposited. These conditions have led to the development of pyrite nodules, siderite bands and nodules, elaborate crystals of radial selenite and gypsum crystals. Since the cutting was excavated, chalybeate springs have developed at in the cutting walls. All these factors combine to create a particularly hostile environment for steel and concrete, and have required careful consideration by the scheme's designers.

Piling rigs working at the southern limit of the scheme have recovered mudstones containing a well-preserved Lower Oxfordian macrofauna dominated by the ammonite *Kosmoceras jasoni*. Due to the exceptional preservation, Dr Kevin Page has been able to distinguish both sexes, the larger forms (macroconchs) being female, and the smaller microconchs being male. Ornamentation on the body chamber is limited to the outer whorl of macroconchs, but developed on the microconchs. The aperture of the body chamber tends to be more elaborate on the microconchs.

Amey's design team is continuing to work closely with Dorset County Council and Skanska to develop and retain key exposures where it is practical and safe to do so. In particular, it is hoped to develop a site near a cycleway at Bincombe revealing the Jurassic–Cretaceous boundary. Dorset County Council and their Jurassic Coast Team are acutely aware of the importance of their local geology, and, thanks to the support of Skanska, Walters UK and a number of experts, Amey's geologists have been able to record the geology that will eventually, alas, be hidden by the new road and its landscaping.

Collaboration on this project has been particularly significant, given the sensitivity and value of Dorset's geology and the scientific benefits it has yielded. At the same time, this has been coordinated to fit safely around site works with no consequent delays to the construction schedule. Despite exceptionally heavy rainfall in November that curtailed the earthworks, the relief road remains on schedule to be completed in Spring 2011. 

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3. WOODS, M.A. (2009) *Weymouth Relief Road: temporary excavations in Jurassic and Cretaceous strata* (May 2009). *Cretaceous Survey and Research Programme*, Open Report OR/09/035. British Geological Survey, Keyworth.

* *Jamie Codd is an engineering geologist with Amey Consulting.*

Society Business

Christmas and New Year closure

The Society (London and Bath) will be closed from 24 December to 3 January inclusive, re-opening on Tuesday 4 January 2011.

Election – Fellows

The following names are put forward for election to Fellowship at the OGM on 3 February 2011

MASON, Daniel Edward; MCKENNA, Orla; MELVIN, Andrew Paul; MOLYNEAUX, Peter; MORLEY, Paul Robin; MORRIS, Timothy James; MORRIS, Jennifer Ruth; MORRISON, Craig; MOWAT, Evan; MUDAME, Lilian Ankinimbom; NASON, Peter Alexander; NEESON, Frances Catherine; NG, Wai Pan; NOWOSIELSKI - SLEPOWRON, Stash Bozydar; NWORAH, Michael Ositadinma; OGODO, Goodluck Ozezire; OLADEINDE, Dapo Olanitori; ONYEJEKWE, Sitenikechukwu; PARKES, Stephen; PARSONS, Tiffany; PATERSON, Ross Davie; PETTIGREW, Ross Peter; ROBBINS, Joanne Catherine; ROBERTS, John Cole; ROCHA, Rogerio; SARGENT, Colin; SCHIEFLER, Donald; SCHMID, Matthias; SCHOFIELD, Alistair James; SEARLE, James Alois Duncan; SIT, Chun Yin Eric; SNOOK, Benjamin Richard; SUTTON, Ian Patrick; TARANIK, Dan; TENNANT, James; THOMAS, Jack; THORP, John Richard; TODD, Philip Daniel; WARK, Charles; ZIMMERMAN, Eric Charles;

Honorary Fellows

Fellows are reminded that they may nominate candidates for Honorary Fellowship at any time. To find out how to do this, please go to www.geolsoc.org.uk/honoraryfellowship. EN



The Geological Society Club

The Geological Society Club, the successor to the body that gave birth to the Society in 1807, meets monthly (except over the field season!) at 6.30 for 7.00 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 £45 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.

Please note – you should keep checking dates here as they may be subject to change without notice.

2011: 26 January; 23 February; 16 March; 13 April (Burlington House - prov.); 18 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 - from whom further details may be obtained. DR

Future meetings

OGMs:

3 February 2011;
13 April 2011.

Council:

2/3 February 2011;
(residential);
13 April 2011.

Research Funds - reminder

The 2011 round of Society Research Funds is now open for applications. Applications for support from any of the Society funds (details on website) must be made on a special form, which can be downloaded from the Society Awards and Research Grants page at www.geolsoc.org.uk/grants.

The form must be completed in full and accompanied by two letters of support from Fellows of the Society. Please send to the Awards Secretary at the Geological Society. In order to be considered at the next available committee meeting, applications and supporting documents should reach the Society no later than **4 February 2011**. The average award has been about £1000. QR

Council nominations – reminder

Fellows received with the October issue of *Geoscientist* two nomination forms – one for the election of new Council members and the other for the President-designate 2011/2012. Details of the process were on the forms and are also in the Governance section of the website. The closing date for the receipt of nominations is 7 January 2011 and nominations will NOT be valid unless they are fully completed, signed and accompanied by a statement by the nominees. Please return to Professor David Manning, c/o Executive Secretary, The Geological Society, Burlington House, Piccadilly, London W1J 0BG

Chartership News



CPD – a new system for a new year.

David Manning (*Professional Secretary*) writes: As all readers will know, CPD is vital for the strength of the profession. What do we mean by CPD? The acronym of course unravels as “Continuous Professional Development” – what we all do all the time, as professionals challenged to solve the problems that those who need our skills bring to us. It is much more than simply attending courses or reading papers; although for many, such activities are useful within a wider framework.

The Geological Society represents our profession, and awards Chartered Geologist and Chartered Scientist status, as well as European Geologist. In so doing, the Society effectively states (to those who are not geologists) that we are a highly professional bunch, and that our Fellows can be relied on when asked to deploy their professional skills. To give this assertion authority, the Society needs to be sure that its chartered Fellows keep their skills up-to-date, and that records exist to demonstrate that.


Two bodies check up on these records – the Science Council, who license us to award Chartered Scientist status, and the European Federation of Geologists, who license us to award European Geologist status. For Chartered Geologist, we audit CPD records internally.

In 2011, all “new” Chartered Geologists will be *required* to continue to maintain their CPD records, thus joining our “Chartered Scientist” Fellows. All our scrutineers are required to demonstrate their commitment to CPD, by providing a record of activity to Professional Committee. Many long-standing CGeols support the reputation of the profession by participating in compulsory CPD recording, especially those who develop new skills to enable them to respond to new business opportunities. We know there are many more out there who could join those currently in the system, and so strengthen our professional authority.

How do we record CPD? Well, we want a system that is easy and acceptable. The Society’s on-line recording system is currently being updated, although its basic structure remains the same. We want Fellows to use this on-line CPD recording system in a way that suits each individual. Many use the ‘Plan-Act-Reflect’ process in CPD. The on-line system has an initial text box, in which you can record your ‘plan’ for the year. The activity section allows the ‘Act’ part to be captured, and of course includes ‘Professional Practice’. This category allows you to reflect upon part of your work that has given your professional ability a boost – we all come across new challenges after which we can reflect and say ‘I learned something from that’. Finally, there is a text box for the ‘Reflect’ component, and of course at the end of the period you can always adjust what the ‘Plan’ box records, in the light of experience.

We know that some Fellows don’t like our points-based system, but a great many do. It is not going to go away. But if you don’t like points, we will not be counting to check how far you have got – please use the on-line system in a way that suits you. Also, recognising that

professional development systems in the workplace create their own CDP documentation, we want to avoid duplication of effort and hope to enable Fellows wishing to upload documentary evidence of career development that might meet both work and Geological Society purposes, to do so. Finally, we recognise that some Fellows take breaks from professional activity for a wide range of reasons. We accommodate such breaks, encouraging those concerned to do as much as they can.

The CPD recording system is completely confidential. For audit purposes, the records are observed only by the Fellowship Services Manager and the Professional Secretary. When used in an application for Chartered status, the Scrutineers look closely at an individual’s record. This system has worked well for many years now, and Fellows can have confidence in its operation. 



Bath time

Mike Bowman writes: Next year marks the 30th birthday of the Petroleum Group of the Geological Society of London. To celebrate this significant milestone we will be hosting a special conference in the historic English city of Bath. The theme of the conference will be ‘Discoveries of the 21st Century...standing on the shoulders of giants’, inspired by

Newton’s famous remark.

The conference programme will consist of around 20 invited talks and keynote presentations. They will cover the highest profile oil and gas discoveries and new plays of the last 10 years and those key technologies and approaches that have enabled these successes. The material is intended to cover topics and content which have not previously been made public. The focus will be upon lessons learned, insights gained and how these inform and impact the future of exploration and production.

The Conference will include sessions on:

- Successes by the Majors: Giant Discoveries & Technology Enablers
- New oil and gas in old basins
- Under the radar screen - wildcatting by independents
- Looking to the Future - Where and What Next?

This will be a prestigious event and we are anticipating all of the key industry players will attend and contribute. In keeping with the more interactive nature of past Bath conferences, a series of panel/audience discussions will explore key themes such as the critical factors behind recent successes, expectations for the future and the contrasting strategies of the majors and independents.

This promises to be a truly high-profile celebration, suitable for the celebration of 30 years of the Petroleum Group’s endeavours at the forefront of Petroleum Geoscience. Places will be limited so early registration is advised. Further details can be obtained from steve.whalley@geolsoc.org.uk.

St Aubyn exhibition

The much-awaited exhibition relating to the collection of Sir John St. Aubyn (1758-1839) (*Geoscientist 18.7 July 2008; Geoscientist 19.12 December 2009*) will arrive at Burlington House on Friday 14 January 2011 and be open to the public until Tuesday 29 March 2011. Admission free.



Shell London Lecture Series



Geological Hazards: How Safe is Britain?

Speaker – Martin Culshaw

Date – 8 December

In Britain, we are usually only aware of geological hazards when a catastrophic event happens elsewhere in the world, such as an earthquake, a volcanic eruption or a tsunami. While Britain does experience these 'geohazards' very occasionally, their effect is usually small. Nevertheless, geological hazards in Britain can damage buildings, structures and infrastructure, costing between £0.5bn and £1bn every year, as well as occasionally causing injury or loss of life.

And in January 2011:

Icelandic volcanoes, interactions between volcanoes, ice and atmosphere

Speaker - Thor Thordarsen (Edinburgh University)

Date - Wednesday 19

Please look online for abstract.

The evening lecture will be followed by the publication launch of Ted Nield's new book, *Incoming! Or, why we should stop worrying and learn to love the meteorite* (*Granta*). There will be an opportunity to purchase signed copies. (See p.15.)

Programme – 3pm talk: 1430pm Tea & Coffee:
1500 Lecture begins: 1600 Event ends.

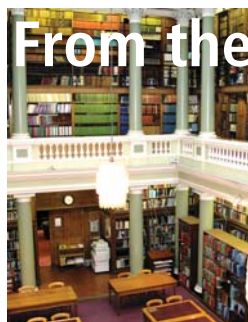
Programme – 6pm talk: 1730 Tea & Coffee:
1800 Lecture begins: 1900 Reception/Book launch.

Further information

Please visit www.geolsoc.org.uk/shelllondonlectures10 or www.geolsoc.org.uk/shelllondonlectures11. Entry to each lecture is by ticket only. To obtain a ticket please contact Leila Taleb 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: Leila Taleb, Event Manager, The Geological Society, Burlington House, Piccadilly, London W1J 0BG, T: +44 (0) 20 7432 0981 E: leila.taleb@geolsoc.org.uk

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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>

Rare book of the month

Michael McKimm writes: Fellows struggling to secure funding for geological excursions might take a leaf out of F W C Trafford's book.

Amphiorama ou la vue du monde... (1874)

is an animated and passionately written account of explorations from the

mountains of Europe, through the Atlantic ocean – '*vagues, calme, bleu resplendissant*' – into the Arctic waters, to the heart of Greenland and beyond. 'I am the first person who has seen it!' he exclaims of the North Pole. It becomes clear, of course, that the journey is an imagined one: Trafford's entire account, detailed and all-encompassing, was written without leaving his home on the Apennine coast.

Trafford's biography is as mysterious as this short book, which would appear to be the only one he published. Barely anything is known about him, though it is clear that he had some experience of sea travel around Britain and the Mediterranean. By extending that experience into the imaginative realm Trafford was exhibiting a common ambition of the Victorian period to master and claim the frozen north. At times both accurate and fluent in its physical description of landforms, as well as knowingly naive (the Arctic comes with a private beach), Trafford's account is extremely funny and wonderfully inventive.

The work of an eccentric visionary, Trafford's book is a treat among the Society's collection for its author's exuberance and adventure when the ability to travel and see the world was only possible through his keen imagination. It is imagination, after all, that leads to the greatest of discoveries.

The Library operates a sponsorship scheme to help preserve and restore its rare books. For more information, contact Michael McKimm in the library, or see the Sponsor A Book page on the Society's website: www.geolsoc.org.uk/sponsorabook



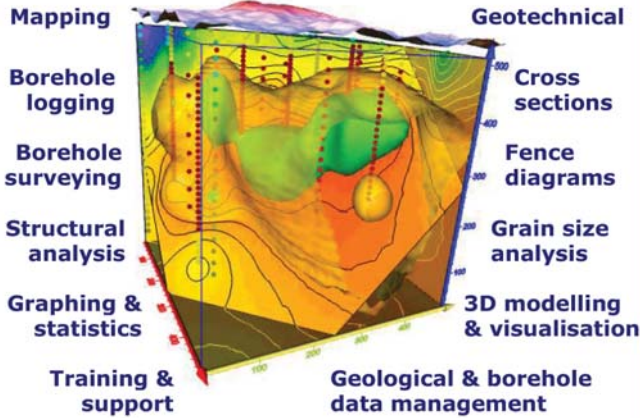
Offsite Access to four more journals!

Offsite access is now available to *Alcheringa: an Australasian journal of palaeontology*, *GFF: journal of the Geological Society of Sweden*, *International Geology Review*, and *New Zealand Journal of Geology and Geophysics* for Fellows of the Society using 'Athens' logins. Descriptions of their subject areas and content can be found on the E-journals section of our website at www.geolsoc.org.uk/ejournals.

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The sale will last two weeks only and is only available via the Online Bookshop. To take part please register via the Online Bookshop home page, and sign up by clicking on "Login/My GSL", found in the right hand corner; then click on "register". Remember to register your details with the Geological Society Online Bookshop newsletter by **Thursday 20th January**. Once registered, you will receive an email at the start of the sale and during the sale detailing the publications on offer.



Continuing Professional Development (CPD) Courses

• **7-9 December.** *Surpac Foundation & Open Pit Workshop.* **Organiser:** Gemcom. **Venue:** Coalville. The Surpac Foundation and Open Pit Workshop is an amalgamation of both the Foundation course and the Open Pit Engineering Workshop (see below). A three-day workshop designed for new users of Surpac offering an understanding of the fundamental concepts of Surpac as well as introducing Surpac's surface engineering toolset. Fellows of the Society receive a 10% discount. Please mention when registering. Contact: Gemcom. T: +44 (0) 1530 835554 E: sales-eu@gemcomsoftware.com W: www.gemcomsoftware.com

• **13-17 December.** *Cement and Cementitious Materials in the Geological Disposal of Radioactive Waste.* **Organiser:** ITC School of Underground Waste Storage and Disposal **Venue:** Walenstadt, Switzerland. Fellows of the Society will receive a discount - please mention when registering. **Fees:** GSL Fellows – CHF 5500; non-Fellows CHF 6100. Previously advertised on www.geolsoc.org.uk, the specified application deadline was 29 October. Contact: Russell Alexander E: russell.alexander@itc-school.org W: www.itc-school.org.

• **13-16 December.** *Minex Foundation & Open Pit Workshop.* **Organiser:** Gemcom **Venue:** Coalville. The course is a detailed four-day course designed for new Minex's geological users. The course aims to expose the user to the main core features of Minex and also provide the detailed procedures to generate seam models. Fellows of the Society will receive a 15% discount - please mention when registering. For further details, please download the PDF available on the society website, or visit www.gemcomsoftware.com.

• **28 January 2011** *Managing Geotechnical Risk Seminar.* **Organiser:** Southern Wales Engineering Group. **Venue:** Cardiff University. In 2001 Professor Chris Clayton authored the ICE publication titled 'Managing Geotechnical Risk'. This seminar in Cardiff will in part be "10 years on", focusing on current knowledge and best practice. A collaborative event with GSL Engineering Group, ICE Ground Engineering Group, Highways Agency, Welsh Assembly Government. Contact: Dave Hannam T: +44 (0)7725918280 E: david.hannam@hotmail.co.uk

Developing Geological Knowledge for CGeol Status, First Steps Ltd. For reservations and information contact Christine Butenuth, info@firststeps.uk.com, 0207 589 7394, www.firststeps.eu.com.

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DECEMBER 2010



• **1-3 December** *Geo-environmental Remote Sensing - GRSG AGM 2010* **Venue:** Burlington House. **Contact:** Dr Richard Eysers, Shell International Exploration and Production, B.V. Kesslerpark 1, 2288 GS Rijswijk (ZH), Netherlands. T: +31 (0) 70 447 3682 F: +31 (0)70 447 3695 E: Richard.Eysers@shell.com W: www.grsg.org.



• **2 December** *Submarine Geohazards - Landslides, Flows and Tsunamis* A Shell University Lecture. **Venue:** Royal Holloway, University of London. **Speaker:** Dr Peter Talling (National Oceanography Centre, Southampton). **Time:** 1730 **Contact:** Leila Taleb T: 020 7432 0981 F: 020 7494 0579 E: leila.taleb@geolsoc.org.uk

East Midlands Regional

• **6 December** *Challenged by Carbon: the oil industry and climate change.* **Venue:** Rattray Lecture Theatre, University of Leicester. **Speaker:** Dr Bryan Lovell **Time:** 1830 for 1900 **Contact:** Dr Ian Hill E: iah@leicester.ac.uk

Southern Wales Regional

• **8 December** *AGM & New Austrian Tunnelling Method Talk* **Time:** Pre-lecture AGM – 1730 for 1800 **Speaker:** Dave Hindle (OTB Engineering Limited) **Venue:** Lecture Theatre 1.25, School of Earth & Ocean Sciences, Main Building, Cardiff University, CF10 3AT **Contact:** Dave Jones T: +44 (0)29 2046 6096 E: david.jones@environment-agency.gov.uk

South West Regional

• **8 December** *Younger Geoscientist Evening* **Venue:** Ley Arms, Kenn, Near Exeter, Devon **Time:** Buffet 1830; Meeting 1900 **Contact:** Cathy Smith E: swrg@geolsoc.org.uk



• **8 December** *11th Glosop Lecture - Making sense of chalk: a total rock approach in Engineering Geology* **Venue:** Royal Geographical Society, London. **Speaker:** Professor Rory Mortimore. **Time:** 1700 for 1730. A flyer with more information can be downloaded from the website. There is no registration or charge to attend the Glosop Lecture. Registration is required for the Glosop Dinner. **Contacts:** Chris Martin E: chris.martin@arup.com Georgina Worrall T: 020 7434 9944 E: georgina.worrall@geolsoc.org.uk



• **8 December** *Geological Hazards: How Safe is Britain? A Shell London Lecture.* **Speaker:** Prof. Martin Culshaw **Times:** 1500 and 1700. **Contact:** Leila Taleb T: 020 7432 0981 F: 020 7494 0579 E: leila.taleb@geolsoc.org.uk

North West Regional

• **9 December** *The Use of Electrokinetics in Ground Improvement and Slope Stabilisation* **Venue:** Williamson Lecture Theatre, University of Manchester. **Speaker:** John Lamont-Black (Operations Director, Electrokinetic Ltd) **Time:** 1830 **Contact:** Chris Berryman E: chrisberryman@terraconsult.co.uk



• **9 December** *Island and Coastal Hydrogeology* **Venue:** Burlington House. **Contacts:** Dr Alan Edwards E: aedwards@slrconsulting.com Prof. Simon Bottrell E: S.H.Bottrell@leeds.ac.uk

West Midlands Regional

• **14 December** *Urban Groundwater Recharge and AGM.* **Venue:** Birmingham University, Dome Lecture Theatre, Geology Department **Time:** 1830 **Contact:** Adrian Jones adrian.a.jones@uk.mwhglobal.com

Central Scotland Regional
Scottish
Geotechnical
Group

• **14 December** *Poster Presentation Competition* **Venue:** University of Strathclyde, Lord Todd Building, Weaver St off Rottenrow East, G4 0NP. **Time:** 1745. **Contact:** Julie Parsons Donaldson Associates Ltd, The Pentagon Centre, Washington Street, Glasgow G3 8AZ.



• **14 December** *Soil-geosynthetic Interaction - obtaining strength parameters for design* **Venue:** Burlington House. Download event flyer for further information on this evening meeting. **Contact:** Alex Kidd Highways Agency, Woodlands, Manton Lane, Bedford MK41 7LW T: +44 (0) 1234 796003 F: + 44 (0) 1234 796060 E: alex.kidd@highways.gsi.gov.uk



• **15-16 December** *Archaeological Geophysics & Environmental Forensics* **Venue:** Burlington House. Two linked day meetings, comprising: 15 December, Recent Work in Archaeological Geophysics; 16 December, Environmental Forensics. **Attendance:** GSL members free. Others: £25 (one day) £40 (two days). Registered students £15 & £20. Please see website for further details. **Contacts:** Louise Martin (Registration) E: Louise.Martin@english-heritage.org.uk Paul Linford (15 December) E: Paul.Linford@english-heritage.org.uk Dr Duncan Pirrie (16 December) E: dpirrie@helfordgeoscience.co.uk

West Midlands Regional

• **11 January.** *Chartership Guidance Meeting.* Evening Meeting - 1900. **Venue:** Old Joint Stock pub, Birmingham. Details to follow shortly. **Contact:** Adrian Jones E: adrian.a.jones@uk.mwhglobal.com

North West Regional

• **13 January** *Quiz Night and AGM* **Venue:** TBC. **Contact:** Chris Berryman E: chrisberryman@terraconsult.co.uk



• **19 January** *Icelandic Volcanoes: Interactions Between Volcanoes, Ice and Atmosphere* A Shell London Lecture. **Venue:** Burlington House. **Speaker:** Thor Thordarson, University of Edinburgh. **Times:** 1500 and 1900. NB: The evening lecture will be followed by the publication launch of *Incoming! Or, why we should stop worrying and learn to love the meteorite* (Granta Books) by Ted Nield. **Contact:** Leila Taleb E: leila.taleb@geolsoc.org.uk.



• **25 January** *Futureproofing Transportation Infrastructure.* Co-organiser: Institution of Highways and Transportation **Venue:** Chartered Institution of Highways and Transportation. Annual joint EGGs/IHT event. **Contact:** Scott Dyball, Chartered Institution of Highways and Transportation, 119 Britannia Walk, London N1 7JE T: 020 7336 1563 F: 020 7336 1556 E: Scott.Dyball@ciht.org.uk W: www.ciht.org.uk.



• **26 January 2011** *Faulting, Surface Deformation, Landscapes and Seismic Hazard* **Venue:** Pugsely lecture theatre, Engineering Department, University of Bristol **Speaker:** Gerald Roberts (Birkbeck, University of London) A Shell University Lecture. **Time:** 1730. **Contact:** Leila Taleb T: 020 7432 0981 F: 020 7494 0579 E: leila.taleb@geolsoc.org.uk

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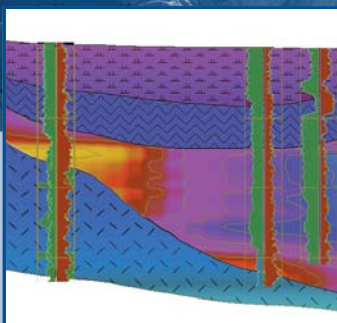
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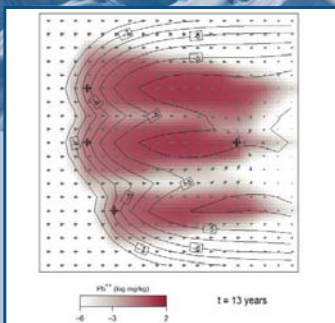
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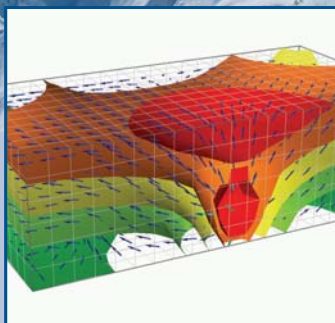
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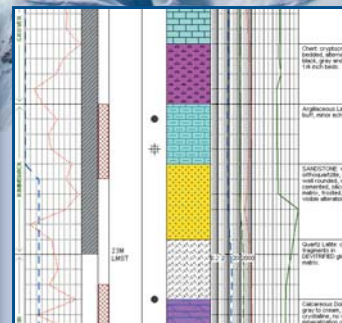
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