

# GEOSCIENTIST

VOLUME 25 NO 4 ♦ MAY 2015 ♦ [WWW.GEOLSOC.ORG.UK/GEOSCIENTIST](http://WWW.GEOLSOC.ORG.UK/GEOSCIENTIST)

The Fellowship Magazine of the Geological Society of London

UK / Overseas where sold to individuals: £3.95

[ FOLLOW US ON TWITTER  
@GEOSCIENTISTMAG ]

## Finding our marbles

The forgotten marvels of Devonshire's ornamental stone heritage

### BEATING PLAGIARISM

How journals can do more to prevent academic fraud

### DIVERSE FIELDWORK

Constructing accessible academic field programmes

### NEW STONE FOR OLD

Finding suitable replacements in restoration projects



The  
Geological  
Society

*serving science & profession*

Upgrade your Fellowship to include

# The Full Book Collection

- ✓ Features online access to hundreds of titles
- ✓ Over 40 new and recent titles published from 2012 to the present day
- ✓ Plus, full access to the Online Book Archive
- ✓ Only £80 for over 400 Special Publications and Memoirs online

**Find out more** about upgrading your Fellowship status to include this useful collection by logging into your **MyGSL account at [www.geolsoc.org.uk/fellowsaccess](http://www.geolsoc.org.uk/fellowsaccess)** or by contacting the membership team **[membership@geolsoc.org.uk](mailto:membership@geolsoc.org.uk)**





## IN THIS ISSUE...

### ON THE COVER:

#### 10 Finding our marbles

Gordon Walkden marvels at the Devonshire marbles now mostly to be seen adorning beautiful buildings all over the world



**ONLINE SPECIALS** *New stone for old*  
Douglas Palmer on re-roofing the Round Church, Cambridge, and the difficulties experienced in locating acceptable substitutes

### FEATURES

- 16 Getting out more**  
Designing accessible field programmes for disabled students by Alison Stokes and Christopher Aitchison

### REGULARS

- 05 Welcome** Ted Nield contemplates his graduation group photo, and how the student body has changed
- 06 Society news** What your Society is doing at home and abroad, in London and the regions
- 09 Soapbox** Fast-track fast one – John Buckeridge thinks he may have a solution to the latest academic scam
- 21 Letters** We welcome your thoughts
- 22 Books and arts** Four new books reviewed by Andrew Robinson, Richard Dawe, Mark Burdett and Steve Rowlatt
- 24 People** Geoscientists in the news and on the move
- 26 Obituary** Michael John O'Hara 1933-2014
- 27 Calendar** Society activities this month
- 28 Obituary** John Crook 1933-2014
- 29 Crossword** Win a special publication of your choice



## The William Smith Map Bicentenary (1815-2015)



### DATE/VENUE

### EVENT/ORGANISER

**14 February 2015**  
University of Nottingham

**William Smith lecture – by Hugh Torrens**  
East Midlands Geology Society

**03 March 2015**  
Yorkshire Museum

**'William Smith, Father of English Geology: his maps – lecture by John Henry'**  
Yorkshire Philosophical Society

**19 March 2015**  
University of Oxford

**William Smith lecture – by Hugh Torrens**  
Oxford Geology Group

**23 March 2015**  
Geological Society

**William Smith birthday celebrations – plaque unveiling & reception**  
Geological Society

**21 April 2015**  
Cardiff University

**William Smith (1769-1839): 200 Years of the 1st Nationwide Geological Map – lecture by Tom Sharpe**  
Southern Wales Regional Group

**23-25 April 2015**  
Geological Society

**William Smith Meeting I: 200 Years of Smith's Map – GSL flagship conference**  
Geological Society

**01-03 May 2015**  
Lyme Regis Fossil Festival

**Mapping the Earth – Lyme Regis Fossil Festival**  
Lyme Regis Fossil Festival

**from 22 May 2015**  
The Yorkshire Museum

**The story of the rocks: William 'Strata' Smith's geological map – exhibition**  
The Yorkshire Museum

**04 June 2015**  
Bath Royal Literary and Scientific Institution

**William Smith's Earliest Careers to 1810 – lecture by Hugh Torrens**  
Bath Geological Society

**06 June 2015**  
tbc

**Bath fieldtrip**  
Geologists' Association

**13 June 2015**  
tbc

**Bath fieldtrip**  
Bath Geological Society

**26 June 2015**  
Natural History Museum

**The Map That Changed the World – lecture by Simon Winchester**  
Natural History Museum

**26 June 2015**  
Rotunda Museum, Scarborough

**Poetry Reading at the Rotunda Museum, Scarborough**  
Scarborough Museums Trust

**mid June – mid October 2015**  
Natural History Museum

**'William Smith: his maps, rocks & fossils – exhibition'**  
Natural History Museum

**03 July 2015**  
The Geological Society

**William Smith Lecture by Tom Sharpe**  
Geologists' Association

**06 September 2015**  
St Peter's Church, Marefair, Northampton

**William Smith's Last Resting Place – field trip**  
East Midlands Open University Geological Society

**08 September 2015**  
TU Bergakademie Freiberg, Germany

**Commemorating William Smith: 200 years of Geomodelling**  
International Association for Mathematical Geosciences

**26 September 2015 – 28 February 2016**  
National Museum Wales

**Reading the rocks: the astonishing map by William Smith – exhibition**  
National Museum Wales

**30 September – 3 October 2015**  
Dorset

**William Smith event & fieldtrip**  
Geologists' Association

**07 October 2015**  
University of Bristol

**'Visualising Landscapes & Geology, Past, Present & Future – commences with lecture by Iain Stewart'**  
University of Bristol

**October 2015 – January 2016**  
Oxford University Museum of Natural History

**Handwritten in Stone: the life & legacy of William Smith – exhibition**  
Oxford University Museum of Natural History

**05 November 2015**  
Geological Society

**William Smith Meeting II: 200 Years & Beyond: the Future of Geological Mapping – GSL flagship conference**  
Geological Society

**19 November 2015**  
Keele University

**William Smith lecture – by Hugh Torrens**  
North Staffordshire GA Group

**For further information about any of the events, please visit [www.williamsmith2015.org](http://www.williamsmith2015.org)**

SPONSORS

ARUP



Global Pacific & Partners



**Geoscientist is the  
Fellowship magazine of  
the Geological Society  
of London**

The Geological Society,  
Burlington House, Piccadilly,  
London W1J 0BG  
**T** +44 (0)20 7434 9944  
**F** +44 (0)20 7439 8975  
**E** [enquiries@geolsoc.org.uk](mailto:enquiries@geolsoc.org.uk)  
(Not for Editorial - Please  
contact the Editor)

**Publishing House**

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

**Library**

**T** +44 (0)20 7432 0999  
**F** +44 (0)20 7439 3470  
**E** [library@geolsoc.org.uk](mailto:library@geolsoc.org.uk)

**EDITOR-IN-CHIEF**

**Professor Peter Styles**

**EDITOR**

**Dr Ted Nield**

**E** [ted.nield@geolsoc.org.uk](mailto:ted.nield@geolsoc.org.uk)

**EDITORIAL BOARD**

**Dr Sue Bowler**  
**Mr Steve Branch**  
**Dr Robin Cocks**  
**Prof. Tony Harris**  
**Dr Howard Falcon-Lang**  
**Dr Jonathan Turner**  
**Dr Jan Zalasiewicz**

**Trustees of the  
Geological Society  
of London**

Prof David Manning  
(*President*);  
Mrs Natalyn Ala (*Secretary,  
Professional Matters*);  
Dr Mike Armitage (*Vice  
president*); Dr Nigel  
Cassidy; Prof Neil  
Chapman; Dr Angela Coe;  
Mr Jim Coppard;  
Mr David Cragg (*Vice  
president*); Mrs Jane  
Dottridge; Mr Chris Eccles;  
Dr Marie Edmonds;  
Professor Alastair Fraser  
(*Secretary, Science*);  
Mr David Hopkins;  
Mr David Jones (*Vice  
president*); Dr Adam Law  
(*Treasurer*); Prof Alan Lord  
(*Secretary Foreign &  
External Affairs*); Dr Brian  
Marker OBE; Dr Gary  
Nichols; Prof David  
Norbury; Dr Colin North  
(*Secretary, Publications*);  
Mr Keith Seymour; Dr Lucy  
Slater; Mr Michael Young

Published on behalf of the  
Geological Society of  
London by  
**Century One Publishing**  
Alban Row, 27–31 Verulam  
Road, St Albans, Herts,  
AL3 4DG  
**T** 01727 893 894  
**F** 01727 893 895  
**E** [enquiries@centuryonepublishing.uk](mailto:enquiries@centuryonepublishing.uk)  
**W** [www.centuryonepublishing.uk](http://www.centuryonepublishing.uk)

**ADVERTISING SALES**

**Ollie Kirkman**

**T** 01727 739 184  
**E** [ollie@centuryonepublishing.uk](mailto:ollie@centuryonepublishing.uk)

**ART EDITOR**

**Heena Gudka**

**DESIGN & PRODUCTION**

**Sarah Astington**

**PRINTED BY**

**Century One  
Publishing Ltd.**

**Copyright**

The Geological Society of  
London is a Registered  
Charity, number 210161.  
ISSN (print) 0961-5628  
ISSN (online) 2045-1784

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

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

**Subscriptions:** All correspondence  
relating to non-member  
subscriptions should be addressed to  
the Journals Subscription  
Department, Geological Society  
Publishing House, Unit 7 Brassmill  
Enterprise Centre, Brassmill Lane,  
Bath, BA1 3JN, UK. Tel: 01225  
445046. Fax: 01225 442836.  
Email: [sales@geolsoc.org.uk](mailto:sales@geolsoc.org.uk). The  
subscription price for Volume 25,  
2015 (11 issues) to institutions and  
non-members is £132 (UK) or  
£151/\$302 (Rest of World).

© 2015 The Geological Society  
of London

Geoscientist is printed on FSC mixed  
credit - Mixed source products are a  
blend of FSC 100%, Recycled and/or  
Controlled fibre. Accredited by the  
Forestry Stewardship Council.



“BERRY HEAD, NEAR BRIXHAM DEVON.  
THE LIMESTONES WERE QUARRIED INTO THE  
1950S, BARELY STOPPING SHORT OF THE  
NAPOLEONIC FORTRESS AT THE TOP”

Front cover image: Courtesy of Southwest  
Regional Coastal Monitoring Programme

FROM THE EDITOR'S DESK:

# Enabled bodies

My graduation group photograph (1978) reveals a vanished world in which nearly all geology graduates were white and male (and not overweight). ‘Successful applicants to Geology’, it said in the Prospectus, ‘will be physically fit, able and willing to undertake strenuous fieldwork in all weather’. Subtext – the halt and lame can forget it.

We were also not colour-blind, having been told on day one that that disability definitely debarred us from a successful career in geology, and they would find something else to do for anyone who owned up. The rest of us were forbidden to wear sunglasses on fieldwork, because they might interfere with the correct appreciation of colour.

It was nonsense of course; and one geology graduate, of that less selective institution the University of Oxford, has recounted the tale of how his own colour-blindness turned the Royal Navy's loss into geology's gain. His name – Simon Winchester FGS. Happily, these days are over, and the only acceptable policy is one that tries to include rather than exclude people.

Later, as a research student I organised my first scientific conference, and devised a questionnaire for registrants that, for the first time, asked about dietary and other special needs, including physical

disability – though I recognised at the time that the question ‘Are you a wheelchair user?’ actually meant ‘Are you Howard Brunton?’. Nonetheless, all the venues I chose were selected with his possible participation in mind. In the end Howard stayed away; but that is not the point.

Having to think is trouble. But the effort is repaid, as our second feature this week - on the subject of designing accessible field activities - clearly demonstrates. And if the Society's recent signature on the Science Council's Declaration on Diversity, Equality and Inclusion (*Soapbox*, *Geoscientist* 24.11) is to mean more than a photo op and a certificate on the mantelpiece, we must ensure that we, and all schools, universities and those who teach in them, make that effort.

One person in that old student photo, however, suffered a condition that no amount of legislation could – or indeed perhaps *should* – assist. Never seen in lectures, sporadically on field trips, he was once knocked unconscious when his head was shunted between two stage-apron boxes, which he was helping porters to shift in the Student Union. He then tried (unsuccessfully) to sue the University for ‘brain damage’. Medics who examined him (just like the rest of us) found they were unable to tell whether his brain was damaged or not. He was just a white, fit, healthy, non-colour-blind idiot.

DR TED NIELD, EDITOR - [ted.nield@geolsoc.org.uk](mailto:ted.nield@geolsoc.org.uk) @TedNield @geoscientistmag



# SOCIETY NEWS

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



## Election results

The ballot for President-designate and Council closed on 31 March.

### President-designate

A total of 935 valid votes were cast in the electronic and postal consultative ballot for President-designate and the result was:

**Malcolm Brown** 589 (63.0%)  
**Bruce Levell** 346 (37.0%)

Malcolm Brown will go forward to the AGM for election as President-designate.

### Council

A total of 982 valid votes were cast for the seven remaining vacancies on Council. There were 20 invalid votes. Results are shown in the table below. The seven candidates receiving the most votes will go forward to the AGM for election as Council members.

#### COUNCIL RESULTS

Name	Votes	Name	Votes
Tricia Henton	633 (64.5%)	Ralph Sibley	461 (47.0%)
Graham Goffey	581 (59.0%)	Stuart Jones	385 (39.2%)
Liv Carroll	538 (55.8%)	Philip Hirst	289 (29.4%)
Rick Brassington	534 (54.4%)	Gavin Gillmore	256 (26.0%)
Christine Peirce	518 (52.7%)	Harry Doust	209 (21.3%)
Katherine Royse	510 (52.0%)		
Jennifer McKinley	465 (47.3%)		

## Notification of officers for 2015/2016

At the AGM, Fellows will be asked to elect the following members of Council as Officers for 2015/16. **President:** Prof David Manning **Vice-Presidents:** Mr Chris Eccles, Mr David Jones **Secretaries:** Mrs Natalyn Ala, Dr Marie Edmonds, Dr Colin North **Secretary, Foreign & External Affairs:** Mr Michael Young **Treasurer:** Mr Graham Goffey



## LONDON LECTURE SERIES

### River Dredging

**Speaker:** Neville White (Environment Agency)

**Date:** 13th May

#### Programme

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

#### Further Information

Please visit [www.geolsoc.org.uk/gslondonlectures15](http://www.geolsoc.org.uk/gslondonlectures15). Entry to each lecture is by ticket only. To obtain a ticket please contact the Society around four weeks before the talk. Due to the popularity of this lecture series, tickets are allocated in a monthly ballot and cannot be guaranteed.

➤ Contact: **Annie Sewell**, The Geological Society, Burlington House, Piccadilly, London W1J 0BG, T: +44 (0)20 7432 0981 E: [Annie.Sewell@geolsoc.org.uk](mailto:Annie.Sewell@geolsoc.org.uk)

## Library newsletter

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

## New acquisitions

A month-by-month list of new books and serial special issues which have been added to the catalogue can be viewed on our website at [www.geolsoc.org.uk/library\\_collections](http://www.geolsoc.org.uk/library_collections)

## Literature searching

Not enough time or struggling to find the information you need? We can search a wide range of resources on your behalf and send you the results directly to your inbox. To find out more about this service, please email [library@geolsoc.org.uk](mailto:library@geolsoc.org.uk)

## E-Journals

Fellows of the Society can access over 90 journals online using Athens authentication. There is no charge to Fellows for this service. Visit [www.geolsoc.org.uk/ejournals](http://www.geolsoc.org.uk/ejournals) to register.

## Document delivery

Not based in London or simply too busy to come to the library? We can send you by post or fax photocopies of articles from our collection. To find out more about this service, please email [library@geolsoc.org.uk](mailto:library@geolsoc.org.uk) or call 020 7432 0999.

## Postal loans

You do not need to live in London to borrow books, maps or journals from the library – we can post them to you! For more information, contact [library@geolsoc.org.uk](mailto:library@geolsoc.org.uk) or call 020 7432 0999.

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



## President's Day

President's Day (Burlington House, 3 June) will begin with the Annual General Meeting (11.00) followed by a buffet lunch with the award winners (members with ticket only – £27.50 per head). As in previous years, recipients of the major medals have been invited to give short talks, and the Awards Ceremony will be followed by presentations by the Lyell, Murchison, William Smith and Wollaston medallists (see below).

The timetable for President's Day and the agenda for the AGM are below.

### Timetable

- ◆ **11.00** Annual General Meeting (members only)
- ◆ **12.30** Lunch with Award winners (members with tickets only)
- ◆ **14.00** Awards Ceremony
- ◆ **15.15** Talks by Lyell, Murchison and William Smith medallists
- ◆ **16.30** Tea
- ◆ **17.00** Talk by Wollaston Medallist
- ◆ **17.30** President's closing remarks
- ◆ **17.40-19.30** Drinks reception

### AGM Agenda

Apologies; Minutes of the Annual General Meeting held on 4 June 2014; Appointment of Scrutineers for the ballots for Council and Officers; Ballot for Council; Annual Report and Accounts for 2014; President's Report; Secretaries' Reports; Treasurer's Report; Comments from Fellows; Formal acceptance of the Annual Report and Accounts for 2014 and approval of the Budget for 2015; Annual

Fellowship subscriptions for 2016; Deaths; Report of Scrutineers on the ballot for Council; Ballot for Officers; Appointment of Auditors; Report of Scrutineers on the ballot for Officers; Election of new Fellows; Any other business; Provisional date of next Annual General Meeting.

### Talks by medallists

- ◆ **Colin Ballantyne (Lyell Medal)**, Professor, School of Geography and Geosciences, University of St Andrews: *Catastrophic landslides in Scotland and Ireland: timing, causes and implications*
- ◆ **Geoffrey Wadge (Murchison Medal)**, Professorial Research Fellow, Department of Meteorology, University of Reading: *Volcanoes and Radars*
- ◆ **Anthony Doré OBE (William Smith Medal)**, Senior Advisor to Exploration Management at Statoil: *The Arctic, and the dark art of regional geology*
- ◆ **James Jackson, (Wollaston Medal)** Head of Department of Earth Sciences, University of Cambridge: *Probing the continents: how deep structure affects surface geology.*

➤ For luncheon tickets please send cheques (made payable to 'The Geological Society') to **Stephanie Jones** at Burlington House, or email [stephanie.jones@geolsoc.org.uk](mailto:stephanie.jones@geolsoc.org.uk). Please also contact Stephanie if you wish to attend the afternoon events for which there is no charge.

### FUTURE MEETINGS

The dates for meetings of Council and Ordinary General Meetings until June 2016 will be as follows:

- ◆ **OGMs:** 17 June 2015; 22 September 2015; 25 November 2015; 3 February 2016; 6 April 2016
- ◆ **Council:** 17 June 2015; 22 and 23 September 2015 (residential); 25 November 2015; 3 February 2016; 6 April 2016



## FELLOWSHIP ELECTION

The following are put forward for election to Fellowship at the OGM on 17 June 2015:

**ABU MAHFOUZ** Isra'A; **ADAMS** Abigail Louise; **ALI** Nezamul; **AMAIRA** Benjamin; **ANAND** Pares; **ARES** Ana; **ARMITAGE** Stephen; **ASHFORD** Lucretia; **ASSADI** LANGROUDI Anya; **AUGUSTINE** Anil; **BARKLEY** Craig; **BARLEY** Brian; **BECKER** David; **BEKMASHEVA** Natalya; **BINNIE** James; **BLACK** Kenneth Thomas; **BOND** Matthew; **BOSWELL** Lee; **BOYLAN-TOOMEY** Justin; **BROOKFIELD** Anna; **BROWN** Lucy; **BRUINVELS** Charles Ronald George; **BURNHILL** Tim; **BUTT** Alice; **BYERLY** Matthew; **CAMPBELL** Ian; **CANNON** Scott; **CHAMBERLAIN** Anthony; **CHAPMAN** David; **CHENG** Ting Cheung; **CHEUNG** Wing Yee; **CLARK** Holly; **CLENT** Thomas; **COKER** Gertrude; **COLLINS** Andrew; **COOK** Nick; **COOMBS** Harris Michael; **COOTE** Vanessa Jean; **COPUS** Jonathan Michael; **COWLEY** Lawrence; **COX** Alex; **COY** Gordon; **CROSS** Nigel Edward; **DAVIES** Tomos; **DAVIS** Brenning Jonathan Bryan; **DAVIS** Jennifer; **DE SIENA** Luca; **DERRY** James; **DICKINSON** Nicholas Alexander; **DICKSON** Joanna; **DREW** Stephen Alexander; **DURRANT** Joe; **DYER** Joao; **EASTWOOD** Laura Ann; **EMBILE** Rodrigo Jr; **EVANS** Marcus Ellwyn; **EVANS** Nicholas; **FAKINLEDE** Akintola; **FLAHERTY** Lucy; **FLATTERS** Lucy; **FLEETWOOD** Robert; **FLEMING** James; **FORREST** Kenny; **FULOP** Anna; **GARVEY** Philip Michael; **GEER** Melanie; **GENT** Lesley; **GLAISTER** Chris; **GRANT** David Alexander; **GRANT** Hanna; **GRESTY** Amy; **GRIFFITHS** David; **GUNN** Kathryn Louise; **HAGEMAN** Wouter Bastiaan; **HALKER** Anthony; **HALL** Thomas David; **HARRISON** Catherine; **HAZELL** Samuel; **HEILBRONN** Gloria; **HILDER** Jevon Marc; **HINTZKE** Michael; **HOWDEN** Freya; **IACOVIELLO** Francesco; **IQBAL** Javed; **JACOBSON** Christopher; **JAMES** Nicholas Trevor; **JOHNSON** Trevor; **JONES** Chris; **JORDAN** Naomi; **KEEGAN** Holly; **KORTEKAAS** Stella; **KRISCH** Ryan; **LANGFORD** Sarah; **LAVI** Jonathan Josef; **LAW** Suneel; **LOEB** David; **LOMBARDO** Luigi; **MACAULAY** Euan; **MACRAE** Calum Iain; **MANNERS** Hayley; **MARIEN** Christian; **MARTIN** Luke; **MARTIN** Nicholas; **MASON** Alexander; **MATHEW** George; **MCCAFFREY** William Dale; **MCCUAIG** Rebecca; **MCDONALD** Liam; **MCFADDEN** Brendon; **MCINTOSH** Scott; **MCLAVERY** Rob; **MELLERS** Sarah; **MIDDLEHURST** Anthony; **MOODY** Loren; **MUTCH** Euan James Forsyth; **NEHAL** Rakesh; **NEWALL** Mark; **NG** Stephen; **NORWOOD** Paul; **O'DONNELL** Darina Marie; **O'NEILL** Aisling; **O'REILLY** Kay Louise; **O'SHEA** Keara; **O'TOOLE** Ryan; **OKEGBEMIRO** Temitayo; **PAGE** Daniel; **PALMER** Michael Scott William; **PAXTON** Richmal; **PENNEY** Camilla Emily; **PHILLIPS** Ellen; **PLUMMER** Rhys; **POUJARDIEU** Romain; **PRICE** Gavin; **PROSSER** David Jeremy; **PUGH** Robert Colin; **REHFELD-KIEFER** Ursula; **REINHARDT** Ashley; **REYNOLDS** Daniel; **RIFAAT** Leith; **RIZZO** Roberto Emanuele; **ROBBINS** Benedict; **ROBERTS** Daniel; **ROBERTS** Gavin; **ROBERTS** Jen; **ROBERTS** Patrick; **SALT** Keith Edward; **SARDISCO** Lorenza; **SAUNDERS** Martin; **SCHOFIELD** James; **SEMPERS** Danielle Elizabeth; **SHEPARD** Grace Margaret; **SIDES** Isobel; **SMITH** Edward; **SOUTHAM** Carolyn; **SPARKES** Cate; **SREEVES** Elizabeth; **STEPHENSON** Simon; **STEVEN** Christopher; **SWEETING** Elizabeth Navila; **SWINNERTON** Robert; **TAHA** Mohamed; **TAYLOR** Kathryn; **THEW** Ciaran; **TIMSON** Victoria; **TRIBICK** Helen Maria; **TUCKER** Richard; **TURNBULL** Colin Barclay; **TURNBULL** Scott; **VALLANCE** Steven; **VAUGHAN** Sam; **WALKER** Jessica; **WALTERS** Gregory; **WARNER** Jack; **WEBB** Richard; **WELLS** Steven; **WILLIAMSON** Zoe; **WOOD** Bill Laurie; **WOODS** Jennifer; **YOULE** Oliver; **YOUNG** Thomas; **ZARREBINI** Sara

# SOCIETY NEWS...

## Fellowship subscriptions for 2016

The Finance & Planning Committee (FPC) was asked by Council to consider how Fellowship fees might more fairly reflect changes in the membership profile of the Society, sensitivities over fee rises, and the underlying principle that fees should cover the costs of services provided. FPC recommended to Council a model which addresses a current disparity in fee bands, defers a general rate rise for one year, and establishes a transparent mechanism for future fee increases. At its meeting on 8 April Council agreed to recommend to the Fellowship for approval at the Annual General Meeting the subscription rates for 2016 shown below.

### New discounted fee band for 60 – 64 age range

The original purpose of fee bands was to reflect ability to pay at different stages in Fellows' careers with discounts provided to those in education, those at the start of their careers as well as to those who have reached retirement. But there are changes in working practices and retirement laws and increasingly Fellows are either continuing to work in senior positions beyond the age of

60 and/or are taking on consultancy-type roles. It is recommended that a new fee band be introduced from 1 January 2016 for Fellows in the 60 – 64 age range. Those moving into this range will pay a reduced fee of 66% (£130) of the total instead of the 50% rate (£99) as would have previously been paid. Those already in the band will continue to pay the lower rate.

### One-year freeze on general fee increases and mechanism for future fee increases

To link future fee increases to Consumer Price Index (CPI) in February of the preceding year as the default measure. Consequently fees for 2016 will rise by 0.0% unless FPC advises Council that there is reason to doubt it provides a reasonable basis for the coming year's fee increase.

As previously reported, Chartership validation and annual registration fees no longer cover the full cost of providing those services and it was agreed at the Annual General Meeting in 2013 to raise the validation fee incrementally over a three year period to £85 (2014), £95 (2015) and £100 (2016) and the annual registration fee to £35 (2014), £42 (2015) and £48 (2016).

### SUBSCRIPTIONS 2016

Subscription type	2015	2016
Junior Candidate Fellow	10.00	10.00
Candidate Fellow	15.00	15.00
Candidate Fellow full course fee	40.00	0.00
27 and under	70.00	70.00
28-33	130.00	130.00
34-59	198.00	198.00
34-59 (Overseas)	152.00	152.00
60-69	99.00	99.00
60-64	-	130.00
65-69	-	99.00
70+	68.00	68.00
Concessions	70.00	70.00
Full time postgraduate MSc	28.00	28.00
Full time postgraduate PhD	41.00	41.00
Supplement (to payer) for Joint Fellowship	58.00	58.00
CGeol supplement payers	42.00	48.00
CSci supplement payers	25.00	25.00



## CHARTERSHIP NEWS

### Bill Gaskarth, Chartership Officer, has news of more accredited company training schemes and university courses.

Recent additions to the list of companies having Accredited Training Schemes are GRM Development Solutions Ltd, ERC Equipoise and Fugro Seacore. The ERC Equipoise scheme is the second from the Oil and Gas sector joining that of RPS Energy.

This brings the number of Accredited Schemes up to 15, though when we count company offices in Hong Kong and Australasia that have adopted a scheme first accredited in the UK, or whose scheme has been adopted in the UK, the number climbs to 19. The list of companies with their logos are shown on the Society's web pages. In addition we have received an application from Listers Geotechnical, which is presently being reviewed.

Interest has been expressed, with an intent to apply, by a number of other companies and it is expected that numbers of Accredited schemes will increase substantially over the next few months. The Chartership Officer continues to visit companies to advise and support applications for Accreditation of schemes and also to make presentations to early career geologists who are preparing for Chartership. Similarly visits to Regional Groups to give talks on Chartership continue to increase in number.

### Cardiff MSc

The MSc in Applied Environmental Geology at Cardiff University has just been Accredited. This brings the number of Accredited MSc courses up to 15. These are at the following universities; Newcastle (4), Manchester (2), Leeds (2), Portsmouth (2), Imperial (2), Heriot Watt and Derby. The list of courses can be found on the Society website, by going to 'Education', 'Careers' and then 'Course Accreditation'.

➤ For further information go online [www.geolsoc.org.uk](http://www.geolsoc.org.uk) or email [chartership@geolsoc.org.uk](mailto:chartership@geolsoc.org.uk)

### GEOLOGICAL SOCIETY CLUB

New diners are always welcome! Dinner costs £57 for a four-course meal, including coffee and port. There is a cash bar for the purchase of aperitifs and wine.

◆ **2015:** 6 May (Athenaeum Club).

Fellows wishing to dine or requesting further information contact **Caroline Seymour** via email [carolineseymour554@hotmail.com](mailto:carolineseymour554@hotmail.com). DR



# Fast-track fast one

Fast-tracking publications leads to quick pecuniary gain, but also opens the floodgates to fraud or plagiarism, and publishers should take appropriate countermeasures says **John Buckeridge\***



**D**ramatic increases in university enrolments, and the extra graduates that result, have resulted in increased competition for tenure in universities. Tenure and promotion are dependent upon research grants and publication record; hence 'publish or perish'<sup>1</sup>.

But with this comes increasing incentive to purloin the ideas of others. In a recent article in *Nature*, Praveen Chaddah extolled the acceptability of some forms of plagiarism, stating 'copied text in a paper's introduction or concluding paragraph' may simply reflect the author's poor English<sup>2</sup>. He implies that this is only unacceptable if it is extensive; Chaddah believes that 'scientists are not writers' and concludes: 'we value the originality of ideas more than language'<sup>2</sup>.

## Missed point

He has missed the point. Non-citing of another's text is theft. Even if simply text, it is nonetheless plagiarism. All that's required is a citation that the text is from another's work. Rather than diminish the article, citation may well enhance it.

On the same day as Chaddah's paper appeared, an article by Henry Fountain in the *New York Times* described an ingenious mechanism to reduce the time to publication<sup>3</sup>. Many journals ask authors to nominate potential reviewers. Provision of suitable referees speeds up the process and ensures that appropriate reviewers are selected for complex topics. On the surface this seems perfectly reasonable.

However an entrepreneurial academic, Chen-Yuan Chen, of National Pingtung University in Taiwan, decided to facilitate the process by inventing 130+ fake reviewers whose email accounts he owned<sup>3</sup>. These he recommended to editors, and his

manuscripts were duly sent for assessment. In reality, these fictitious pseudonyms permitted rapid self-review of his own work and positive response to the editor with few recommended changes. Papers were published in remarkably short order. The saga concluded when an editor became increasingly concerned and contacted Chen's university, leading to Chen's exposure.

## Penalties

This leads us to contemplate the penalties for plagiarism and the role of reviewers. To suggest that intellectual theft may be 'culturally acceptable' is obfuscation. If there is confusion in the minds of students (and staff) we must move to a mandatory code of practice for researchers. This can be underpinned by knowledge that one infringement is one too many and will impact very negatively on one's future career.

As to reviewers... many of us spend considerable time in reviewing manuscripts. But reviewing can be tedious indeed and often goes beyond assessing science, and into editing the manuscript. A fair manuscript becomes a good manuscript following sound, professional review.

In light of this, why not name reviewers with each publication? This will acknowledge their work and neatly diminish opportunities to invent fake referees.

**References** - 1) Buckeridge & Watts, 2013. On ethics, the pursuit of knowledge, truth and status in the hallowed halls of academe. *Integrative Zoology* 8: 223-231. 2) Chaddah, P., 2014. Not all plagiarism requires a retraction. July 10. *Nature* 511:127. 3) Fountain, H., 2014. Science. [http://www.nytimes.com/2014/07/11/science/science-journal-pulls-60-papers-in-peer-review-fraud.html?\\_r=0](http://www.nytimes.com/2014/07/11/science/science-journal-pulls-60-papers-in-peer-review-fraud.html?_r=0)

\* **John Buckeridge** is Professor of Natural Resources Engineering, RMIT University, Melbourne and Chair, IUBS Ethics Commission.

## SOAPBOX CALLING!

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

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

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

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

“NON-CITING OF ANOTHER'S TEXT IS THEFT. EVEN IF SIMPLY TEXT, IT IS NONETHELESS PLAGIARISM. ALL THAT'S REQUIRED IS A CITATION THAT THE TEXT IS FROM ANOTHER'S WORK”  
John Buckeridge



# FINDING OUR MARBLES



**Gordon Walkden\*** tells the story of a long-forgotten but quite exceptional range of ornamental marbles

Geologists tend to overlook ornamental stone, but all of geology can be there - sometimes at its most challenging. Perhaps our difficulty is that we see so much in a polished stone, yet often have no idea where the stone is *from*. Devonshire marbles are a fine example. Their colour and diversity brought them to prominence in the Victorian era, fully at ease in aesthetic competition with foreign rivals, and yet in the 20th Century they slipped into obscurity and are now probably the least recognisable of all widely-used ornamental stones.

Devonshire marbles tell a great story, geologically and historically. Their 'Britishness' was branded on them by the great Victorian architect George Gilbert Scott when he used them in his Foreign Office building (1861-75) on Whitehall. We can now 'map' more

than 70 buildings up and down Britain, and a few more abroad, with significant examples of Devonshire. There may be North American, South African and Pacific examples. Devonshire marbles are in Melbourne Cathedral.

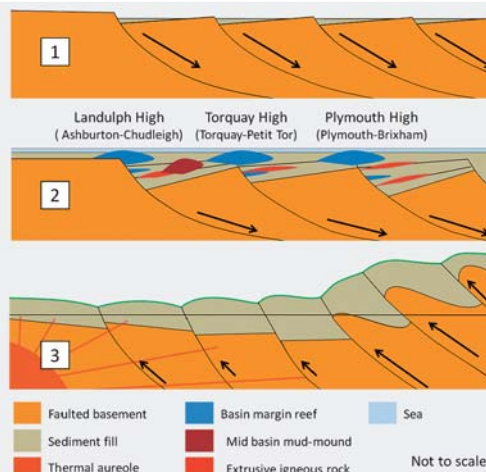
Produced from the same marble works in Plymouth and Torquay, south Devon were vases, tazzas, inlaid desk sets, dressing-table sets and some magnificent stone-inlay specimen marble tables. While Devonshire marble shafts and panels became standard finery in Gothic Revival buildings, these artefacts became mansion 'must-haves', in direct competition with a very similar stone-inlay industry in Derbyshire. Thanks to Trevor Ford and others<sup>1</sup> we know a lot about the Derbyshire industry, but of the Devonshire one precious little is recorded.

**Above:** Berry Head, near Brixham Devon. The limestones were quarried into the 1950s, barely stopping short of the Napoleonic fortress at the top



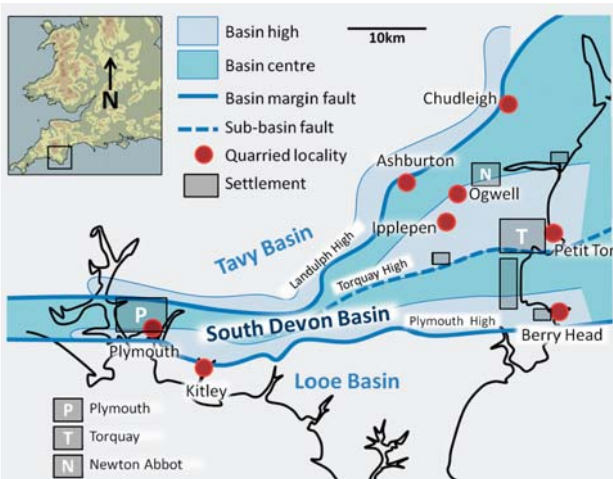
# DEVONSHIRE MARBLES TELL A GREAT STORY, GEOLOGICALLY AND HISTORICALLY

Clustered shafts of polished British stones surround a crossing pier at St John's College Chapel, Cambridge. Including two Devonshire varieties



Clockwise from top right: The sedimentary and tectonic evolution of the South Devon Basin

Devonshire marbles in the first floor gallery at Oxford Museum of Natural History. Marble varieties are (l-r) Red Ogdell, Black Chudleigh and Red Radford which comes from near Plymouth



The Devonian seas of South Devon. Outlines are based on present day outcrop. The original north-south extent of the South Devon Basin was far greater than this and no attempt is made to restore basins to their original dimensions

## Competition

Much of the British and foreign competition faced by Devonshire marble is well documented by Monica Price<sup>2</sup>, and sadly, for many of these marbles (especially Devonshire ones) the best outcrops are now the buildings they adorn, the marbles characteristically rich in fossils, often veined and stylolited.

George Gilbert Scott brought together all his favourite British ornamental stones in a single building at St. John's College Chapel, Cambridge (1869), using granite, serpentine, Irish and Devonshire marble. The Oxford Museum of Natural History's (1861) ground floor and first floor arcades are supported by a whole collection of British ornamental stone shafts, including Devonshire examples.

Until the start of my Devonshire marble project, perhaps a dozen building interiors were known, mostly anecdotally, and most without detail of variety or

provenance. Now over 70 UK examples are recorded and documented, with a further dozen or more unvisited 'probables'. These buildings contain columns, panels, reredos, chancel screens, pulpits, fonts, pavement, stairways and whole galleries executed in Devonshire. Some use Devonshire on the outside (e.g. County Chambers, Queen Street, Exeter, a charming mid to late 19th Century building). Two of the finest examples of interior use are St. John's Church, Torquay (1885, mainly varieties of *Ashburton*, *Petitor*, *Lummaton* and *Ogdell*.) and Birmingham Art Gallery and Museum (1885, mainly varieties of *Ogdell*, *Ashburton* and *Petitor*. Many more remain to be discovered.

## The rock

Marble, to most of us, means a recrystallised limestone; but this is certainly not what the mid- to Late

Devonian Limestones of Devon are like. These 'marbles' still retain their original fossil and sediment detail, even down to some of the original radiaxial-fibrous marine calcite cements that precipitated in empty reef cavities.

Sedimentary basins started to develop across what became south-west Britain in the early Devonian<sup>3</sup> some 410 million years ago, in response to stretching, thinning and faulting of the crust - all attributable to a complex interplay of plate tectonic movements during the final stages of the assembly of NW Europe<sup>4</sup>.

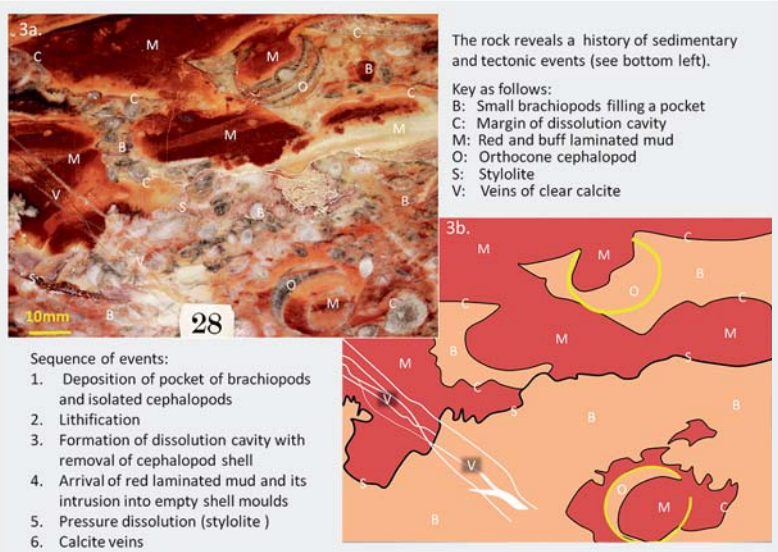
By the Middle Devonian the 'South Devon Basin' was filling with carbonate sediments organised into reefs and lagoons. There was a worldwide trend to carbonates at this time, becoming one of our most important reef-forming periods<sup>5</sup>. Some basins were huge (the Canning Basin in NW Australia extending across more than 150,000 km<sup>2</sup>). ►



The great Devonshire specimen marble table at the Natural History Museum, South Kensington, London. This is the largest of just 10 such specimen marble tables so far recorded



Sedimentary textures in a block of Red Pettor marble, Pettor Tor Quarry, St. Marychurch, Devon. Specimen 28, Watson Collection, Sedgwick Museum, Cambridge (Buildings Guide Group 6, E/CB/1)

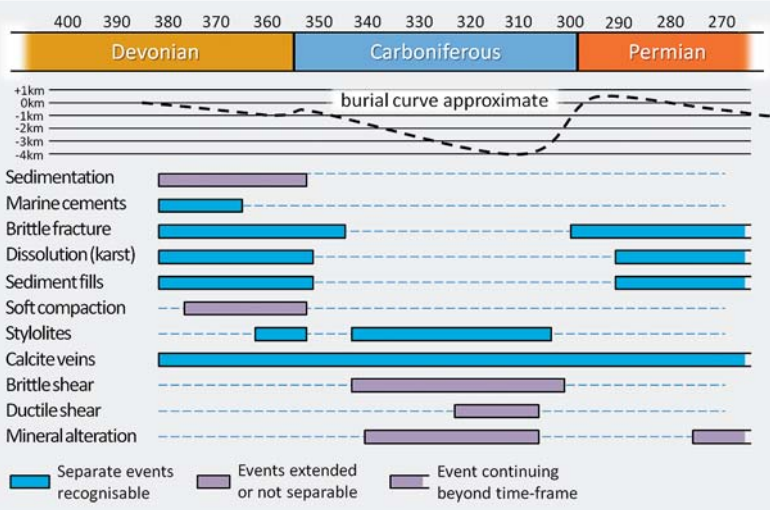


► The South Devon Basin was a fraction of that, perhaps up 2000 km<sup>2</sup>, allowing for later crustal shortening. It all came as a response to worldwide sea-level rise<sup>6</sup>, which drowned basin margins, inhibited the incursion of clastics and allowed carbonate-secreting organisms to get into full swing. Some areas sometimes shallowed to mudflats and even underwent subaerial exposure as minor sea-level cycles tussled with local tectonics.

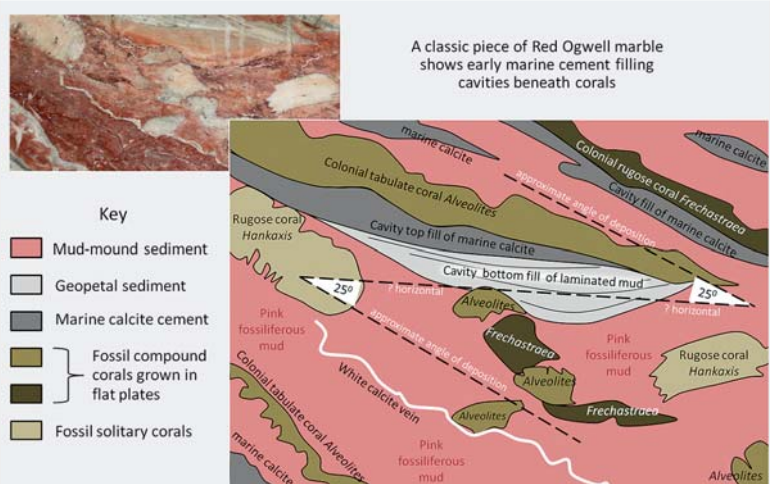
A switch from basin extension and subsidence to compression and uplift began towards the end of the Devonian<sup>3,4</sup>. Carbonate reef and lagoon sediment was now a good few hundred metres thick. First it became exposed, cracked, fissured, weathered and injected with extraneous sediment; then it was entombed beneath a substantial thickness of clastic mud and sand, derived from the advancing tectonic slices.

The new compressional regime lasted well into the Carboniferous, during which time the limestones became buried, fractured, sheared, veined and stylolitized. Some even became cleaved as Variscan basin-inversion swept across, but burial was never sufficient to induce recrystallisation. The usual story is one of 'detail lost – marbles gained'; but in this region the nearest thing to that occurred after Permian erosion and intrusion of Cornubian granites had returned the thrust and folded core of the orogen to surface. Locally, phreatic haematisation soaked the limestones in a mix of oxic and anoxic water to redden and alter them. In this shallow but intensely duteic environment, they began to lose detail. Radial fibrous marine calcites, for example, became

The textural evolution of Devonshire marble. Events/processes are based upon direct observation of polished samples, stone in buildings and rock at outcrop. No examples show all texturing events\*



Ogwell marble in a stair panel at the Fitzwilliam Museum, Cambridge. Plates of rugose and tabulate corals apparently lie parallel to the sediment. However, a geopetal fill\*



\* Please see online for full captions



first white, then red and blocky, and finally haematite. For the most part, limestones retained a mix of original sedimentary plus subsequent tectonic textures.

## Rock to block

Panels of best Devonshire grace the interiors of some of the finest marble buildings in Britain. The Fitzwilliam Museum in Cambridge, for example, has stair panels (1875) that constitute the best outcrops of Ogwell mud-mound facies to be found anywhere. Added to that, one of the specimen marble tables lay unrecognised on the first floor gallery there for years, before being identified during this research as the probable work of John Woodley, the south Devonshire master mason.

Woodley managed to beat off some of the best Derbyshire marble-table crowd to a Prize Medal at the Great Exhibition of 1851. This was no mean feat, for the Derbyshire industry was heavily sponsored both by Aristocracy and Royalty. Confusingly, it was the 6th Duke of Devonshire who was behind the Derbyshire manufacturers and, judging by his own stone artefact collection, we could guess that His Lordship had never even visited Devonshire. What he must have said about Woodley's victory is not recorded.

Woodley tables are now prized possessions. A large one, exactly fitting the description of the Woodley table exhibited at the Great Exhibition, occupies the stairway mezzanine at the Cromwell Road entrance to the Natural History Museum Earth Galleries in South Kensington, London. Radial-patterned, fit for an Arthurian gathering, it is presented with no provenance history apart from its inscription 'DEVONSHIRE MARBLE' – surely the mark of an assertive exhibition-piecer. With the help of Colin Scrutton, a document now describes and identifies the marbles and fossils in this important table.

In the great entrance arch just below this mezzanine can be found the rare green *Kitley* marble, an unusual Devonian serpentinite which probably is recrystallised (but look at it carefully). In the abutments there is also *Pink Petitor*. At nearby Brompton Oratory are magnificent Plymouth *Radford Red* marbles in columns, and a grey stromatoporoid-rich variety in the great pilasters. In the opposite direction from the museum is St. Augustines'

Church on Queen's Gate. Here you can find a wonderful William Butterfield interior (1876) featuring more of the *Petitor* range as well as *Red Ogwell*, *Black Ogwell*, *Ashburton* and a fine font bowl in solid Derbyshire crinoidal.

## Marble industry

Devonshire's marble industry operated from works at opposite ends south Devon, Plymouth and Torquay. Buildings and artefacts are usually silent about their stones, so crucial in unlocking this information has been the building stone collection at the Sedgwick Museum, Cambridge. Their 26 precious polished Devonshire marble specimens were mostly supplied by Plymouth and Torquay manufacturers. The Devonshire stones (along with hundreds of others) were catalogued and fully documented early last Century by John Watson<sup>7</sup>, with examples of where the stones were used. This collection was crucial in solving some mysteries. Several specimens, the *Petitor* varieties, come from just one area among the cliffs and beaches at Babbacombe near Torquay.

Were it not for the Rev. John Swete, dilettante West Country artist and writer, we might have missed the connection between *Petitor* marble and a man who, almost by chance, became the founding father of the Devonshire marble industry. Robert Fulton (1765-1815) was a promising American artist, inventor and engineer who came to Britain in 1887<sup>7</sup>. Perhaps his ambition to study painting here was just a cover, for he had already established an interest in steam power. Indeed, it was not long before he moved on to France, dabbling in submarines and explosives for a certain Napoleon Bonaparte.

Swete crossed Fulton's path on one of his many Devon rambles<sup>8</sup>. He describes descending into Petit Tor cove where "a Mr Fulton an ingenious gentleman" had erected "a large building, which contains a Machine for the sawing of blocks of marble.... by the means of a single horse turning a wheel". "This of his own invention", notes Swete, it would "saw as much stone in a day as a Labourer hath been accustomed to do in fifteen".

Now visualise, by complete contrast, the urban splendour of the grand Adam brothers' neoclassical (Georgian) terraced development of The Adelphi, off the Strand, headquarters of the Society for the Encouragement of Arts, Commerce and Manufactures (SEACM, ►



**Above:** *Ashburton marble. Typically dark grey with an abundance of fossils. The large grey banded ovate objects are stromatoporoids and some of the smaller white ones are corals. This is now compacted, stylolitised, veined and sheared. Together with its host formation, this dark organic-rich rock might once have made a fine hydrocarbon source rock!*

“DEVONSHIRE'S MARBLE INDUSTRY OPERATED FROM WORKS AT OPPOSITE ENDS SOUTH DEVON, PLYMOUTH AND TORQUAY. BUILDINGS AND ARTEFACTS ARE USUALLY SILENT ABOUT THEIR STONES, SO CRUCIAL IN UNLOCKING THIS INFORMATION HAS BEEN THE BUILDING STONE COLLECTION AT THE SEDGWICK MUSEUM, CAMBRIDGE”

► now the Royal Society of Arts). Apparently, Fulton had sent them a model of his Devonshire horse-powered sawing machine, for he received in response their Silver Medal for services to ‘mechaniks’ in 1794<sup>9</sup>.

The turn of the 19th Century was not a good time for coastal quarrying. With the Napoleonic threat increasing, Fulton soon departed to work for the French. Perhaps aware of this, and in any case keen to promote the use of British marble over European competition, SEACM resolved (1804) to set up a long term reward, or ‘Premium’, for notable examples of British marbles. In 1809 a claimant is recorded; a Mr JP Hubbard, of Picket Street, Temple Bar<sup>6</sup>. He had a fine holiday home in the Cliffs at Babbacombe and was already active in the former Fulton quarry at Petit Tor. His account of the quarry, delivered to the Society in support of his submission, is a gem. The quarry was 12 acres in extent, on the beach and flooded at high tide. A specially-built wharf enabled the loading of stone directly into boats bound for Teignmouth. Hubbard had available panels and columns of marble five feet or more, with a sale price at four shillings per linear foot, half the price of

‘foreign’, and he believed that the number of workmen he could soon employ would be 60 to 100.

Certainly this impressed SEACM, for not only did it display his 60 polished samples in their Great Room, but they awarded Hubbard their Gold Medal for the session. Devonshire marble had come of age and, indeed, the competition was out of sight. Sadly, so now are those 60 polished samples of *Petitor* marble; nor is there any sign of Fulton’s model.

Medal notwithstanding, Hubbard’s Petit Tor enterprise failed to prosper, and he suffered big losses during a storm. The costal quarrying business must have remained difficult and Hubbard had to bring in families from elsewhere to work and supervise his ambitious enterprise. One such was that of Daniel Woodley, father of master mason John Woodley, later of marble table fame.

Despite the eventual British victory the economy was in a mess and marble was probably not in great demand. But gradually the East India Company, *inter alia*, breathed new life into Imperial Britain’s economy and with the increased wealth the demand for marble embellishment burgeoned. The fame of Petit Tor quarry became assured for the

next 75 years or more and it even became a tourist attraction, as a contemporary print testifies. The Victorian building boom, especially in Gothic churches, arrived with the 1840s.

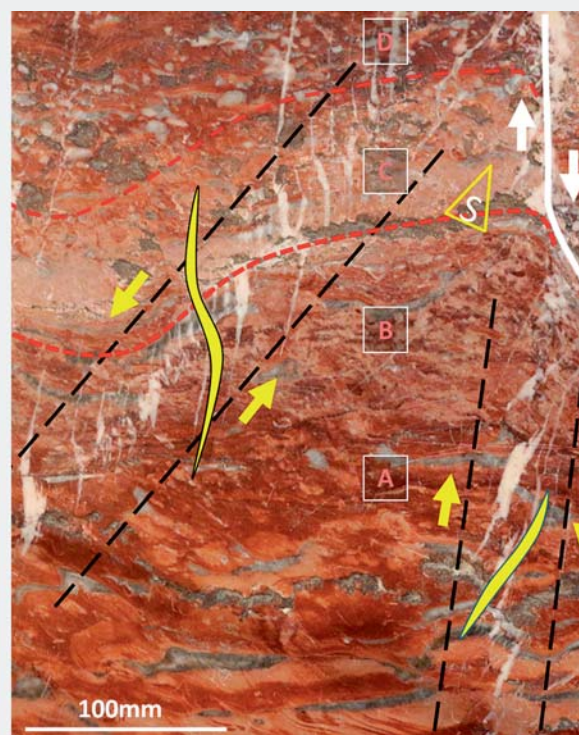
## Petit Tor enigma

Nudist members of the Society, especially male ones, may know Petit Tor Cove in a more social context. Its geology, though, and that of adjacent Petit Tor Down and nearby bays, is dominated by mid- Devonian limestones and Permian breccias.

Petit Tor marbles (*Petitor*) are the most spectacular and varied in the Devonshire palette. They are usually distinguished by the abundance of grey banded early marine cement and some show a long history of early- to late fracturing, stylolitisation and multiple veining. *Petitor* can be haematised, dolomitised or limonitised giving a range of colours from pink to red or yellow. In fact, to a limestone lover it is often a complete mess. In 1832, De la Beche<sup>11</sup> saw it as “a breccia composed of large blocks (some many tons in weight) ...the cementing matter is sometimes a red sandstone, at others a reddish clay. The marble (known as Babbacombe marble) is wholly derived from these blocks”. It is not a bad description of



“Marble Quarries, at Petit Tor, near Torquay”. Lithograph, Villeneuve, 1828. The quarry was a tourist attraction through much of the 19th Century. In 1828 it was in the hands of Daniel Woodley. Note Lighthouse and Cottage – possibly dating from Hubbard, neither of which is now recognisable



Shearing, faulting and bedding deformation in Red Petitor marble, sanctuary pavement, St. John's Church, Torquay



what we see today, and no other Devonshire marble matches this confused geology.

The mess at both specimen and outcrop scale has dogged interpretation at Petit Tor for a good while. In the 1830s, De la Beche<sup>12</sup> first interpreted it as a rubble layer positioned above the main limestone in the cliffs; later he suggested it was at the same level but on the other side of an anticline. Even the main mass of limestone at Petit Tor Down has an unclear basal relationship, sheared and thrust against the younger Saltern Cove Formation. More recently, Brian Leveridge and co-workers<sup>13</sup> discounted any direct link between the Breccia and the main limestone body, mapping it as a rubble of Devonian limestone that arrived with the breccias and sands of the Late Permian.

My own picture confirms the separation. Made of Mid Devonian limestone, the Petit Tor Breccia (the *Petitor marble* horizon) rests on the Late Devonian Saltern Cove formation; but perhaps we should take this relationship at face value. The Breccia could be a Devonian mass flow deposit of 'Saltern Cove age' rather than Permian. As such it would be a Devonian rubble layer brought to surface and then reburied in the late Permian, rather than arriving as

a thick debris layer in unknown circumstances during the Late Permian.

It could represent an Upper Devonian basin slope-failure for example, and there are examples elsewhere of big loose mid-Devonian limestone boulders within the Late Devonian Saltern Cove formation so that bits were certainly falling off at the appropriate time. If the Breccia is a submarine mass flow deposit of Late Devonian age, then the unconformity needs to be above it and its arrival pre-dates tectonism. If it is a landslide of Permian age then the unconformity must be beneath it and the marble rubble will have been tectonised before it arrived. Easy to say; difficult to tell. The present state of outcrop and accessibility makes it a very hard call - now there's a challenge! ♦

#### FURTHER READING

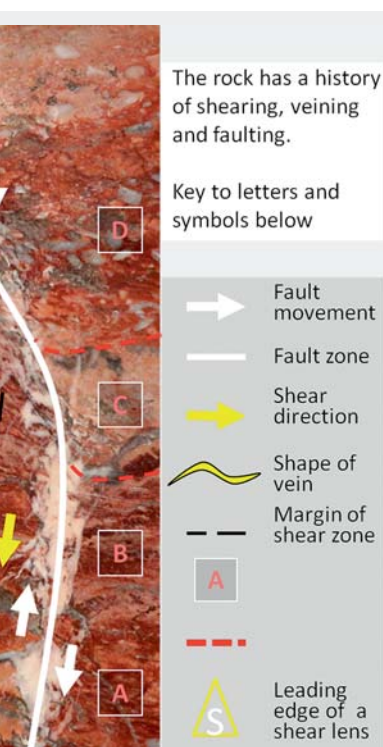
The story of Devonshire marbles, featuring great geology, spectacular buildings and some unexpected historical and architectural associations, is explored in a new 2-volume book to be published by the Geologist's Association in the Autumn.

\* **Gordon Walkden** is Emeritus Professor of Geology in the University of Aberdeen, UK

## REFERENCES

- 1 Tomlinson, J.M., 1996. Derbyshire Black Marble. *Peak District Mines Historical Society Special Publication 4*. Peak District Mining Museum, Matlock Bath, Derbyshire. 95pp.
- 2 Price, M.T. 2007. *The source book of decorative stone*. Quintet Publishing. 288pp.
- 3 Leveridge, B.E., 2011. *The Looe, South Devon and Tavy basins: the Devonian rifted passive margin successions*. *Proceedings of the Geologists' Association* 122 (2011) 616–717.
- 4 Leveridge, B.E. & Shail, R.K., 2011. *Marine Devonian Stratigraphy of Great Britain*. *Proceedings of the Geologists' Association* 122, 540–567.
- 5 Copper, P. 2002. *Silurian and Devonian reefs: 80 million years of global greenhouse between two ice ages*. In: KIESSLING, W., FLUGEL, E. & GOLONKA, J. (eds), *Phanerozoic Reef Patterns*. Society of Economic Paleontologists and Mineralogists, Special Publication 72, 181–238.
- 6 Haq, B.U. & Schutter, S.R., 2008. *A Chronology of Paleozoic Sea Level Changes*. *Science*, 322, 64–68.
- 7 Dickinson, H.W., 1913. *Robert Fulton Engineer and Artist his life and works*. John Lane London 333pp. (<https://archive.org/details/robertfultoneng00dickgoog> accessed June 2014)
- 8 Swete, Rev. J., 1789–1800. *Travels in Georgian Devon*. The illustrated journals of the Reverend John Swete. Todd Gray and Margery Rowe, eds. 4vols, Devon Books, Tiverton.

♦ Full references for this article may be found in the version published in *Geoscientist* online. *Editor*.



*Aerial view of the area around Petit Tor, St. Marychurch with geological boundaries and locality details*



# GETTING OUT **MORE**





## Alison Stokes and Christopher Aitchison\* present diverse perspectives on accessible geoscience fieldwork

All learners, regardless of their stage of education, should see geoscience as an accessible academic subject offering viable career opportunities.

For those with disabilities, however, the often rigorous programme of fieldwork required by undergraduate degree programmes can present physical and psychological challenges that deter participation<sup>1</sup>.

By signing the Science Council's 'Declaration on Diversity, Equality and Inclusion', the Geological Society of London (GSL) has committed to enhancing the diversity of talent attracted into the geosciences. One key to achieving this is to provide greater opportunities for learners with disabilities to participate in accessibly designed field experiences.

A recent one-day fieldtrip conducted during the 2014 Geological Society of America (GSA) annual meeting in Vancouver was attended by 35 geoscience students and academics, almost half of whom (17) self-disclosed a physical, sensory or cognitive disability. Together they explored the feasibility and potential for both designing and conducting accessible fieldwork.

This particular fieldtrip successfully demonstrated that, with the necessary planning and organisation, it is possible to develop and deliver geology fieldwork that is inclusive of learners with a wide range of disabilities, while retaining a high degree of intellectual rigour and the capacity to deliver learning outcomes similar to 'traditional' fieldwork.

The idea of delivering a fully accessible field experience for both students and academics with disabilities was developed by Christopher Aitchison (University of Cincinnati), whose 2011 study<sup>2</sup> involved mobility-impaired undergraduate and postgraduate students in a cave and karst field experience at Mammoth Cave National Park, Kentucky. The 2014 'Sea-to-Sky Highway' accessible field course was modified from a one-day introductory-level fieldtrip originally developed by

Brett Gilley at the University of British Columbia, and focused on exploring the geology exposed along British Columbia's famous Highway 99. The critical difference between these two excursions was the inclusion of academics as co-participants. This enabled students and instructors to work together in partnership, and explore first-hand how learners with different disabilities can be accommodated in a geological field setting.

### Vancouver

The geology of the Vancouver region is impressive and inspiring, characterised by dramatic landscapes shaped by glacial and volcanic processes, and prone to potentially destructive natural hazards. During pre-fieldtrip planning, Gilley and Aitchison identified a range of field locations that were fully accessible (e.g. suitable for wheelchairs with sufficient loading and unloading clearance) and ensured that enough stops provided suitable toilet facilities. The locations selected between downtown Vancouver and Whistler included coastal and beach sections, road cuts, mountain viewpoints, and National Park hiking trails. Each site offered multiple means of physically accessing and engaging with the geological setting and featured spacious, flat areas that facilitated group participation and discussion, while enabling up-close access to specific outcrops as well as small-scale features like glacial striations.

This, coupled with the development of specific course materials (including tactile maps of key locations, and text and audio versions of the field guide) ensured that the day's activities were accessible to participants with a wide range of physical, sensory and cognitive disabilities (including limited mobility, visual and hearing impairments, learning disabilities and autism).

On the day, each student was paired with an instructor-partner, with at least one of each pair having a self-disclosed disability. Allocating partners before boarding the buses meant that everyone had someone to sit and chat with *en route* to the first location, and helped to initiate ►



**Above top:** Typical scenery of the Vancouver region

**Above middle:** Student participants share their expectations and prior experiences during a pre-fieldtrip focus group

**Above lower:** Stawamus Chief (702m) near Squamish, British Columbia

**Left:** Hiking trail in British Columbia, Canada. Accessible to all?

“GEOLOGICAL SOCIETY OF LONDON HAS COMMITTED TO ENHANCING THE DIVERSITY OF TALENT ATTRACTED INTO THE GEOSCIENCES. ONE KEY TO ACHIEVING THIS IS TO PROVIDE GREATER OPPORTUNITIES”



Participants were able to investigate a diverse range of rock types



Participants in the Sea-to-Sky Highway accessible fieldtrip



The fieldtrip was successful in encouraging people to interact and work with each other

► the social interaction that is such an important (yet often overlooked) aspect of the field experience<sup>3</sup>.

Activities were all designed to promote inquiry and to encourage participants to collaborate with, and learn from, each other – not just in terms of their geologic knowledge, but also their personal experiences and perspectives of fieldwork, and the implications of sharing and discussing geologic content in the natural environment while focused on physical or sensory accessibility. All participants shared ideas about how to provide inclusive instruction outside the classroom for individuals with specific accommodation needs. Thus, by extending participation to both learners and instructors with disabilities – the first ever project to do so – the Sea-to-Sky Highway actively encouraged the development of a cross student-faculty community focused on the common goal of identifying guidelines for creating future opportunities for inclusive geoscience fieldwork.

## Outcomes, implications

As well as experiencing a previously inaccessible geological environment, a critical outcome for participants in the 2011 Mammoth Cave study was the shared experience of being part of a group, and the creation of both a unique learning community and personal friendships, many of which have been maintained since the event. A key aim of

the current study was creating a similar, unique community - and both post-fieldwork evaluation and research data on the students' experience suggest that the 'Sea-to-Sky Highway' field course was successful in this. Significantly, the students overwhelmingly identified the social aspects, (i.e., having a shared experience and forming new friendships) as particularly memorable.

The creation of a fledgling community of learners and academics dedicated to moving the 'accessible fieldwork' agenda forward, with a view to creating a guidance document for designing and developing such inclusive undergraduate fieldwork, is one of the experience's most important and tangible outcomes. But it was not the only outcome. The opportunity was also of great personal significance to many, as demonstrated by this student:

*"[My] over-riding memory? Lack of a cloud of panic. So, I was able to break through that barrier, and just be open to being an observational scientist without having that cloud of anxiety, with all the questions of: will I be judged? Will people think I'm 'playing up' my disability? Will they think I'm lazy? How am I going to access this? All those questions were gone. We were able to take a step back and be observational geoscientists, right?"*

Learners with disabilities may not experience fieldwork in the same way as the more physically able, but they are perfectly able to participate, and by doing

so, fulfil the requirements necessary to complete undergraduate geoscience degrees. The students on this fieldtrip were all highly intelligent, articulate, and deeply interested in and motivated by geology, with the potential to excel in whatever field they choose. That they should feel denied the potential to excel in geoscience – and that the geoscience profession should be denied their talent – simply because they possess a different set of abilities from the majority of their peers, is manifestly unjust.

What the project demonstrated is that fieldwork can indeed be inclusive, and that there are clear benefits when including both the learner- and instructor-perspective in designing it. To do this successfully requires a change in mind-set. Accessible fieldwork is not about achieving the impossible, but about what is possible - reducing those unnecessary aspects of fieldwork that are not directly aligned to learning objectives, and approaching design and delivery so as to enhance overall outcomes for all learners.

## Getting involved

If you want to learn more about participating in or providing an accessible geoscience field course, please contact the International Association for Geoscience Diversity (IAGD) at [info@theiagd.org](mailto:info@theiagd.org) or visit [www.TheIAGD.org](http://www.TheIAGD.org). The IAGD are





particularly keen to encourage international collaboration in guidance aimed at higher education institutions.

The Society is organising a one-day meeting at Burlington House, Friday 26 June, entitled Confronting barriers to inclusion: opening the gate to accessible fieldwork. The meeting is convened by Alison Stokes. To find out more, and to register, please go to [www.geolsoc.org.uk/Accessible-Fieldwork-Meeting](http://www.geolsoc.org.uk/Accessible-Fieldwork-Meeting). ♦

#### ► ACKNOWLEDGEMENT

This project was conducted with assistance from the International Association for Geoscience Diversity (IAGD) and supported by the National Science Foundation (NSF) GEO-1441185, the Society of Exploration Geophysicists (SEG), and the Geological Society of America (GSA) On to the Future Program. Photos courtesy, International Association for Geoscience Diversity ([www.theIAGD.org](http://www.theIAGD.org))

#### ► REFERENCES

For references for this article please see *Geoscientist* Online [www.geolsoc.org.uk](http://www.geolsoc.org.uk)

\***Alison Stokes** is Lecturer in Earth and Environmental Science Education, Plymouth University ([alison.stokes@plymouth.ac.uk](mailto:alison.stokes@plymouth.ac.uk)).  
**Christopher Atchison** is Assistant Professor of Science Education, University of Cincinnati, and Executive Director of the International Association for Geoscience Diversity ([atchisc1@ucmail.uc.edu](mailto:atchisc1@ucmail.uc.edu))



*All group discussions and activities were designed to be accessible and inclusive for all participants*



*Tactile maps created for participants with visual disabilities*



*A student with a visual impairment is exploring the regional geology using tactile maps*



*A diverse range of tools were used to communicate – here a student with a hearing impairment is able to stay involved in the group discussion with the help of an assistant using a mobile phone*



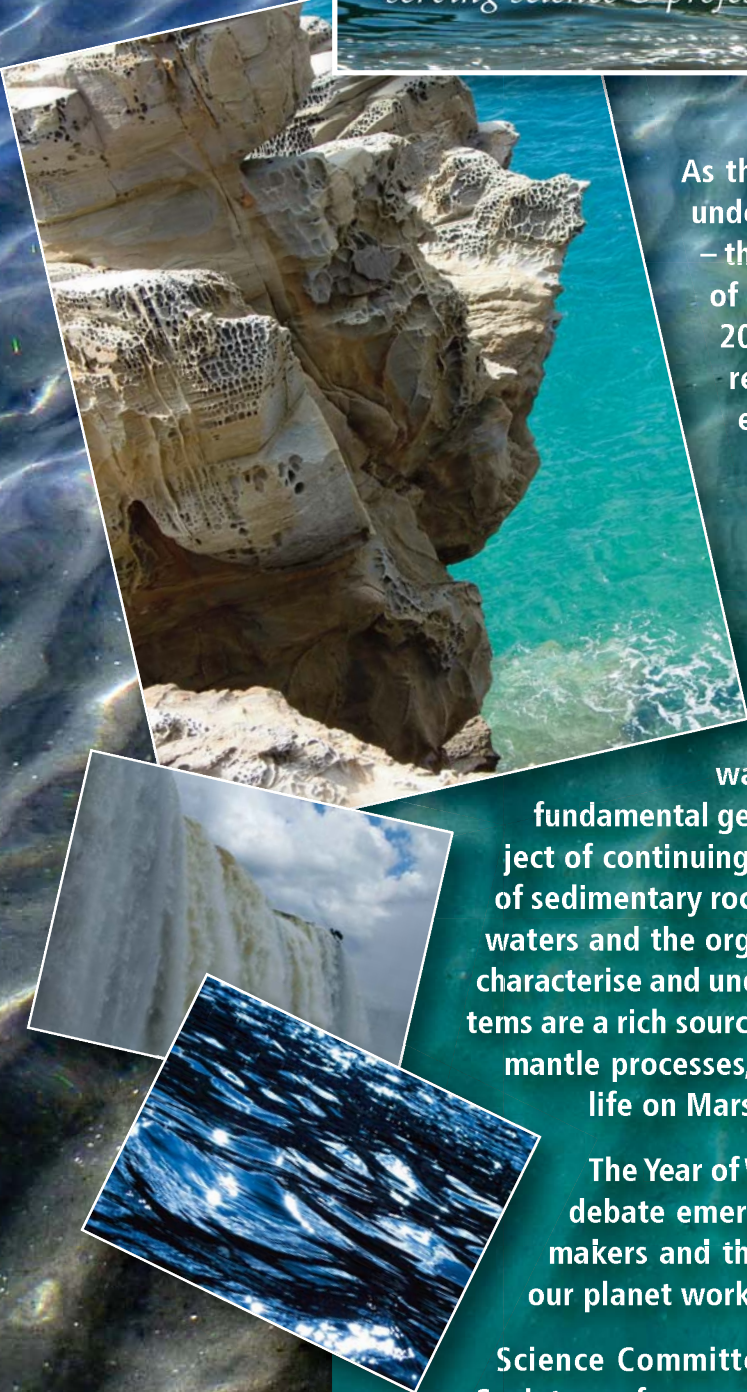


The  
Geological  
Society

*serving science & profession*

2  
0  
1  
6

**YEAR OF  
WATER**



As the Year of Mud at the Geological Society gets underway, we are already starting to plan for 2016 – the Year of Water! Themed years are at the heart of the Society's science strategy, and throughout 2016 we will explore a wide range of water-related geoscience through research conferences, lectures, our education programme and other activities.

An understanding of groundwater and hydrogeology is crucial to addressing a wide range of societal challenges, from securing fresh water supplies and mitigating flood risk to extracting shale gas and other hydrocarbons and safely disposing of our nuclear waste. But water also plays an important role in fundamental geological processes, many of which are the subject of continuing research. Dewatering is key to the formation of sedimentary rocks. Studying the isotopic signatures of ancient waters and the organisms that were formed in them can help us characterise and understand past environments. Hydrothermal systems are a rich source of mineral resources. Water also affects deep mantle processes, and is at the heart of our efforts to look for life on Mars and elsewhere.

The Year of Water will provide an opportunity to share and debate emerging research, and to communicate to policy-makers and the wider public the vital role of water in how our planet works and how we can live sustainably on it.

Science Committee is now inviting proposals for Geological Society conferences to take place during the Year of Water.

### **Get involved!**

To suggest a meeting topic or activity, or to find out more, please email Laura Griffiths. E: [laura.griffiths@geolsoc.org.uk](mailto:laura.griffiths@geolsoc.org.uk)



## New Executive Secretary must be a Chartered Geologist

Sir, Many Fellows will be as surprised as I am to read that the recruitment advertisement in *Geoscientist* (25.3, April 2015, p30) for a new Executive Secretary does not specify that the successful applicant will be a professional geologist; only that 'He/she will have a strong empathy for the membership, very likely with experience and professional credibility or academic credentials in a related field'.

In 1996 the Governance Committee recommended to Council, and Council concurred, that the post of Executive Secretary should be occupied by a professional geologist. These were the grounds for replacing Richard Bateman with Edmund Nickless. I was an Officer at the time and know what a traumatic experience this was for the Society. The change marked a 'seismic shift', as the profile of the

Society metamorphosed from 'ancient academics' to 'professionalising moderns'<sup>1</sup>.

The wisdom of the change has been demonstrated over the last 18 years. Furthermore the Chief Executive Officers of our sister societies, the Institute of Physics, the Royal Society of Chemistry and the Society of Biology, are all members/fellows of their respective bodies, some even PhDs (Biology, Physics) and one even a professor (Physics).

Surely the Geological Society of London would exhibit retrograde metamorphism if it did not appoint a professional geologist to the high profile post of Executive Secretary.

**DICK SELLEY**

**Reference - 1)** Herries Davies G L 2007: *Whatever is under the Earth*. Geological Society of London. Bath. 356pp.



**Professor David Manning, President,** replied: We would be delighted to appoint a Chartered Geologist to this role, and look forward to receiving applications from those Chartered Geologists who feel qualified to meet the requirements of the position.

## Arthur Holmes Meeting 2015

Tsunami Hazards and Risks: Using the Geological Record

25 September 2015    The Geological Society, Burlington House, Piccadilly, London, UK

**Preliminary Confirmed Speakers:**

David Tappin  
BGS, UK

Ken Ikehara  
AIST, Japan

Kazuhisa Goto  
University of Tohoku, Japan

Sue Dawson  
University of Dundee, UK

Katsu Goda  
University of Bristol, UK

Simon Day  
UCL, UK

Finn Løvholt  
Norwegian Geotechnical Institute, Norway

Stéphan Grilli  
University of Rhode Island, USA

Vasily Titov  
NOAA, USA

William Power  
GNS Science, NZ

Costas Synolakis  
University of Southern California, USA

Conrad Lindholm  
NORSAR, Norway

Gordon Woo  
RMS UK

With Earth's growing population clustered increasingly on coastlines, tsunami hazards are of concern worldwide. Within the framework of the bilateral agreement between the Geological Societies of London and Japan, a linked pair of one-day symposia is bringing together geoscientists and risk assessors to assess tsunami hazard in an integrated manner, with a view to facilitating more quantitative and evidence-based evaluation of their scale, nature, location and timescales. This is the second meeting organised in partnership with the Geological Society of Japan. This meeting will focus on the Atlantic margin and Europe, and on tsunami modelling, hazard and risk assessment.

**Field Trip**  
Location - The Shetland Islands, Scotland  
There will be a pre-meeting, two-day field visit to the Shetland Islands, Scotland. This will take place on 22-24 September 2015. The field trip will focus on investigating sedimentary tsunami deposits associated with the prehistoric Storegga slide. It will also look at late Holocene tsunami evidence and extreme storm inundation deposits.

**Call for Posters**  
We welcome poster presentation contributions for this meeting. To be considered for a poster presentation please send an abstract of no more than 400 words to Jess Aries no later than 5pm on Friday, 7 August 2015.  
E: [jess.aries@geolsoc.org.uk](mailto:jess.aries@geolsoc.org.uk)

**Further information** - W: [www.geolsoc.org.uk/ahm15](http://www.geolsoc.org.uk/ahm15)

## Puzzle of Earth's Uninterrupted Habitability

11 November 2015    Geological Society, Burlington House, London, UK

**Confirmed Keynote Speakers:**  
Professor Tim Lenton  
(University of Exeter)  
Professor Toby Tyrrell  
(University of Southampton)

**Convenors:**  
David Waltham (Royal Holloway University of London)  
Graham Shields (University College London)

**For further information please contact:**  
Jess Aries, Conference Office,  
The Geological Society,  
Burlington House, Piccadilly,  
London W1J 0BG  
T: 0207 432 0983  
E: [jess.aries@geolsoc.org.uk](mailto:jess.aries@geolsoc.org.uk)  
W: [www.geolsoc.org.uk/puzzleofearth](http://www.geolsoc.org.uk/puzzleofearth)  
[@geolsoc](https://twitter.com/geolsoc), [#puzzleofearth](https://twitter.com/puzzleofearth)

**REGISTRATION IS NOW OPEN**

Environmental conditions at the Earth's surface have been continuously suitable for life for more than three billion years. Temperatures, for example, have only varied by few tens of centigrade despite large changes in solar luminosity and atmospheric composition. Since the Archean, the planet has not once been rendered sterile.

However, the reasons for this long-term life-friendliness remain contentious. How has Earth's climate avoided the runaway warming shown on Venus or the runaway cooling of Mars? Has Earth's relative stability resulted from geochemical feedback (e.g. through silicate weathering), the stabilizing influence of a complex biosphere (i.e. the Gaia hypothesis), good luck (e.g. purely fortuitous cancellation of solar warming by decreased greenhouse gas concentrations) or is long-term life-friendliness simply the consequence of life's extraordinary adaptability (allowing it to survive even Snowball Earth events)?

**Call for Posters**  
We welcome poster presentation contributions for this meeting. If you would like your poster to be considered for presentation at this conference, please send an abstract of no more than 400 words to Jess Aries no later than Sunday, 5 April 2015.

## Earthquake Storms



Ever since the devastating 1906 earthquake in San Francisco, the San Andreas fault—first recognised by Andrew Lawson in 1895—has been the world's most famous geological fault.

Yet despite its celebrity, there are hardly any good recent books about the fault for the non-specialist: perhaps only historian Philip Fradkin's *Magnitude 8: Earthquakes and Life along the San Andreas Fault*, which gives more space to the fault's impact on Californian politics, economics and culture than to seismology.

*Earthquake Storms*, by California-trained geologist John Dvorak, is therefore a welcome addition. Its chief strength lies in combining the lives and personalities of key geologists and seismologists, such as Lawson, Charles Richter, John Tuzo Wilson and Kerry Sieh, with the theoretical essentials and practical details of their scientific work, so that the former really do illuminate the latter—notwithstanding the regrettable absence of a map of California or any seismological diagram. For example, we learn the inside story of the classic Edwardian photograph (reproduced in the book) of a woman, dressed in a dark ankle-length skirt and hat decorated with flowers, standing somewhat incongruously beside the 'mole track' ridge thrown up by the San Andreas fault as it ruptured 270 miles of northern California. The photo was taken by geologist Grove Karl Gilbert, a member of the 1906 earthquake commission; the woman is his lover Alice Eastwood, a leading botanist with a daredevil streak. Just weeks before, while her San Francisco apartment burned in the great fire started by the earthquake, Eastwood had twice scaled the iron banisters of the wrecked central staircase of the California Academy of Sciences so as to rescue her rare botanical collection from the sixth floor.

The book's title is taken from geophysicist Amos Nur, who suggested in 2000 that one earthquake may trigger another, causing them to cluster together in 'earthquake storms'. Several major earthquakes over a period of mere decades around 1200BC were responsible for the destruction of western civilisation (Knossos, Mycenae, Troy, etc) in the eastern Mediterranean, argues Nur. The same pattern has been occurring in southwest China along the northern edge of the Tibetan plateau since the 1890s, says

Dvorak. Might a seismic storm also occur in southern California in coming decades, following two puzzling Mojave Desert earthquakes in the 1990s? Conceivably. But given the mind-boggling complexity of California's faults—700 of which have ruptured over 10,000 years—earthquake prediction is currently impossible, as Dvorak finally has to concede.

Reviewed by **Andrew Robinson**

### EARTHQUAKE STORMS: THE FASCINATING HISTORY AND VOLATILE FUTURE OF THE SAN ANDREAS FAULT

JOHN DVORAK, 2014. Published by: Pegasus Books  
254pp (hbk) ISBN: 9781605984957  
List price: \$27.95 [www.pegasusbooks.us](http://www.pegasusbooks.us)

## Harness Oil and Gas Big Data with Analytics



The title of this book intrigues. The text explains that big data are data sets that are so large and complex that they are difficult to process using current conventional processing methods, and analytics is the process of finding meaningful patterns within these sets.

Data sets are growing in size, in part because of the ability of modern information-sensing devices to collect vast quantities of data, as with seismic acquisition. The sizes are mind-boggling, with single data sets going up to (maybe soon) exabytes (10<sup>18</sup>). 'Analytics' uses massive parallel-computer software to uncover hidden patterns. The output of 'hidden' knowledge is often visualised in tables and graphics.

The practical aspect of analytics is needed for the oil and gas industry because the new generation of managers and geoscientists who are replacing the retiring 'old school' lack their experience of vision, but have an appreciation of statistics and soft computing methodologies. Analytics can show otherwise hidden patterns and may be able to retain the lost experience and enhance decisions.

The book therefore provides a complete view of big data and analytics techniques as applied to the oil and gas industry. After two chapters outlining the processes, the book moves to chapters of specific

case-studies where data analytics have been used within exploration and production. Applications, using case histories of seismic attribute analysis, give guidance on reservoir characterisation, while other chapters explore drilling and completion optimisation, reservoir management production forecasting and optimisation, and exploratory predictive analysis. Analytics suggest better-informed models of subsurface reservoir characterisation and decisions for drilling/production optimisation for conventional and unconventional fields.

This book, which is written by an industry practitioner, is a description of the subject rather like the technical information found in 'service company' literature. The text mentions, but does not detail, the mathematics or algorithms of the methods commonly applied - such as neural networks, decision trees, genetic algorithms, data mining and artificial intelligence. Unfortunately, many of the figures are disappointing and unhelpful, with many taken from papers which were originally in colour but printed in greyscale. Some are almost unreadable. I suspect too the vocabulary might be difficult for some. A fuller glossary giving more definitions of the acronyms and terms scattered within the text would be helpful for the 'old school'.

*Harness Oil and Gas Big Data with Analytics* is not going to turn the reader into a digital oilfield expert, but should give an idea of where/how analytics might be beneficial.

Reviewed by **Richard Dawe**

### HARNESS OIL AND GAS BIG DATA WITH ANALYTICS

KEITH R. HOLDAWAY, Published by John Wiley & sons, 2014. ISBN 978-1-118-77931-6 hbk; ISBN 978-1-118-91095-5 epub; ISBN 978-1-118-91094-5 epdf  
List price (hbk): £50.00 W: [www.wiley.com](http://www.wiley.com)

## Introduction to Ocean Remote Sensing



This book explains how remote sensing works; particularly remote sensing of biogeochemical properties, infrared and microwave retrieval of sea surface temperature and salinity etc., passive microwave measurements, scatterometer wind retrieval, altimetry and SAR. The





book tells you how to understand observations from Earth-observing systems, and the observations' importance to physical and biological oceanography. The author presents all the necessary mathematics to support and understand the text.

The book contains a useful list of abbreviations, acronyms, mathematical symbols, references and an appendix giving technical details. Also included are descriptions of the online archives where data can be obtained (e.g. NASA and ICES) and online tools for working with the data. It is suitable for graduate and advanced undergraduate students in oceanography, remote sensing and environmental science, and a practical resource for researchers and professionals.

The author begins by talking of the oceans and how important they are, covering about 70% of the Earth's surface and containing most of the Earth's water. They are dynamic at several scales and contain important and productive ecosystems. They play a big role in climate change and are important for heat storage and transfer.

The book considers the emitted and reflected radiation from the open ocean and how the ocean properties modify them at the surface. Satellite images (e.g. radar) can be used to detect such things as oil slicks. The book relates how the atmosphere and its constituents (e.g. oxygen, nitrogen and especially water vapour) affect the transmission of radiation in the visible infrared and microwave regions of Earth observation.

Passive multi-frequency microwave imagers are very useful for sea surface temperatures and salinity, sea ice extent, scalar and vector wind speeds. Ocean winds are important for the way they drive ocean currents, transfer heat, gases, heat and moisture, energy and momentum. They can be examined in detail using a scatterometer, which are of great importance in weather forecasting.

The Radar Altimeter can provide much information about global variation in sea surface height, swell and wind speeds (all very useful measurements in oceanography). Side-looking radars are also discussed (powerful tools to examine ice and ocean surface backscatter properties at a high resolution).

This is a comprehensive text, well-written, printed and bound, containing many diagrams and colour photographs and well worth its rather modest cover price.

Reviewed by **Steve Rowlett**

#### AN INTRODUCTION TO OCEAN REMOTE SENSING

SEELYE MARTIN, Published by: Cambridge University Press  
Publication date 2014 Hbk ISBN 978-1-107-01938-6 Edition: 2. 521pp  
List price: £45. [www.cambridge.org](http://www.cambridge.org)

## Deformation Structures and Processes within the Continental Crust



Oviedo in late 2011.

The first four papers are presented under the theme of 'Structures: shear zones and folds' and provide novel and interesting approaches to quantifying, analysing, and differentiating strain within single and multiple generations of ductile structures. Lisle (2013) reviews new and existing methods for analysing finite strain in shear zones and presents a new algebraic and, graphical method to quantifying finite strain where volume change during deformation is considered.

Frehner & Exner (2013) apply a numerical approach when considering the refraction patterns in axial foliation (fans) to understanding the distribution of strain within buckle folds and make important observations regarding the rheological sensitivity of layers to recording strain. Calvín-Ballester & Casa (2013) employ geometrical approaches to differentiate the development of two superimposed thrust-fault - cleavage-forming events formed during progressive orogenic deformation in a foreland fold-and-thrust belt. Weisheit *et al.* (2013) utilise a range of thermochronological data coupled with structural analysis and reconstruction to demonstrate the development of a crustal-scale fold occurred over two deformation cycles spanning ~200Ma.

The next five papers, presented under the theme of 'Magmatism and Structure', provide examples of how the development of structural features is frequently linked to magmatic activity and hence often amenable to geochronological dating. Rutter *et al.* (2013) use <sup>40</sup>Ar/<sup>39</sup>Ar dating techniques on pre- and syn-tectonic volcanism to constrain the duration of the main

movement along a crustal-scale transform fault system. Similarly, Rodríguez-Méndez *et al.* (2013) date diabase dykes linked to basin-wide magmatism to better constrain the changing geodynamic regime heralding the break-up of Pangaea. Magma often utilises crustal-scale structures as conduits for ascent and emplacement and Oriolo *et al.* (2013) using detailed structural, kinematic, and geophysical data, show the importance of pre-existing cross-strike structures associated with flat-slab segments as reactivated conduits for magmatism; a significant observation for economic geologists.

Caggianelli *et al.* (2013) model the thermal effect of a magmatic intrusion on the rheology of the host rocks suggesting that while multiple intrusions within the crust would be required to sustain mechanical weakening, a single intrusion maybe sufficient to nucleate a normal fault that could allow further thermal weakening through crustal extension. Morgan *et al.* (2013) highlight deficiencies in the 'Titanium-in-Quartz' geothermometry associated with Ti heterogeneity and its chemical activity during metamorphic conditions.

The final three papers are presented under the theme 'Microstructures and Rheology' and illustrate the effect of crystallographic preferred orientation (CPO) of mineral grains and recrystallisation on mechanical behaviour of rocks at the micro-scale. Liana-Fúnez & Rutter (2014) experimentally explore the relation between CPO of calcite in limestone during ductile deformation and localisation of strain geometries. Similarly, Piazzolo & Jaconelli (2013) consider the rheology of sillimanite aggregates in gneiss defined by slip-systems at high-temperatures related to the aggregates CPO. A numerical approach by Borthwick *et al.* (2013) explores the effects of recovery recrystallisation in rocks close to their deformation temperatures showing that microstructures can be modified at temperatures lower than experienced during peak deformation.

Reviewed by **Mark N Burdett**

#### DEFORMATION STRUCTURES AND PROCESSES WITHIN THE CONTINENTAL CRUST

S LLANA-FÚNEZ, A MARCOS, & F BASTIDA (Eds),  
2014 Geological Society of London Special Publication  
394 ISBN 978-1-86239-627-2 239pp (hbk)  
List price: £90 (Fellows £45; Other societies £54)



# The Geology of Geomechanics

28-29 October 2015

The Geological Society, Burlington House, London, UK

## Keynote speakers

**Dr Tony Addis**  
(Baker Hughes)

**Professor Terry Engelder**  
(Pennsylvania State University)

**Dr Julia Gale**  
(University of Texas at Austin)

**Professor Rick Sibson FRS**  
(formerly University of Otago)

**Dr Mark Tingay**  
(Chevron)

**Professor Mark Zoback**  
(Stanford University)

## Convenors

**Jonathan Turner**  
(BG Group)

**Dave Healy**  
(University of Aberdeen)

**Richard Hillis**  
(Deep Exploration Technologies  
CRC)

**Michael Welch**  
(Schlumberger)

## Further information

For further information about  
the conference please contact:

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

T: 0207 434 9944

E: [jess.aries@geolsoc.org.uk](mailto:jess.aries@geolsoc.org.uk)

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

Geology-of-Geomechanics-15

This conference aims to bring together geologists and engineers from the petroleum, radioactive waste disposal, carbon sequestration, mining and geothermal communities to discuss the links between the geomechanical disciplines and mainstream geology.

We define geomechanics as the study of stresses in the crust, and their impact on the stability of rocks (e.g. reservoirs, seals, faults) and man-made features therein (tunnels, boreholes, repositories).

Stress leads to change and we need data, tools, models and workflows to understand and manage it. Geomechanics is a well-established sub-discipline but until recently has had relatively little airing across geology. However, geomechanical models depend critically on geological inputs. We are particularly interested in what geological observations can add to the predominantly present-day observations and analysis of geomechanics.

Furthermore, what can geology learn from the unique observations of geomechanical datasets? Geologists and engineers therefore need to share their understanding of the key issues in geomechanics, and to develop a common language to describe our respective approaches to it.

## FINAL CALL FOR ABSTRACTS

For this meeting we encourage submission of papers that address the full spectrum of geomechanics applications. We aim to promote lively discussion and closer collaboration among and between geologists and engineers – both researchers and practitioners.

*The deadline for oral abstracts is 1 June 2015. Please submit your abstract as a Word document to Jess Aries. E: [jess.aries@geolsoc.org.uk](mailto:jess.aries@geolsoc.org.uk)*



# PEOPLE NEWS

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



## IN MEMORIAM [WWW.GEOLSOC.ORG.UK/OBITUARIES](http://WWW.GEOLSOC.ORG.UK/OBITUARIES)

### THE SOCIETY NOTES WITH SADNESS THE PASSING OF:

Adatia, Ruth Horman*	Lane, Alan*
Armstrong, David *	Leach, Bernard *
Borg-Costanzi, Joseph A *	Mills, J A *
Cater, Maxwell Clinton *	McSweeney, LJM *
Evans, J Russ*	Morris, Richard Oliver *
Foster, Michael *	Quick, David *
Fothergill, T *	Rivington, John Blackett*
Heeley, Martyn *	Scott, Barry*
Hooper, P L *	<b>Seymour, John</b>
<b>Hubbard, Julia A E B *</b>	Watson, John S
Kosler, Jan *	Wright, Martin *

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

If you would like to contribute an obituary, please email [ted.nield@geolsoc.org.uk](mailto:ted.nield@geolsoc.org.uk) to be commissioned. You can read the guidance for authors at [www.geolsoc.org.uk/obituaries](http://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](http://www.geolsoc.org.uk/obituaries).



## CAROUSEL

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

### ◆ David Abbott



David Abbott is the recipient of the 2015 Ben H Parker Memorial Medal, the oldest and most distinguished award granted by the American Institute of Professional Geologists (AIPG). The Parker Memorial Medal is awarded to individuals who have long records of distinguished and outstanding service to the profession. Abbott is best known for his *Professional Ethics & Practices* column in AIPG's *The Professional Geologist* that he has been compiling since 1995.

### ◆ Drew Craig



Drew Craig, a geologist with Rocklore Exploration Services Limited, undertook a gruelling charity ultra challenge in April, attempting to complete the 250km Marathon des Sables (Moroccan Sahara), and another 42.2km in the London Marathon. Drew took on this challenge on behalf of the Royal Hospital for Neuro-disability, which provides a range of services to those with neuro-disabilities and injuries, ranging from long-term care to rehabilitation. Donations:

<http://uk.virginmoneygiving.com/DrewCraig>

### ◆ Ted Nield

Ted Nield's book *Underlands – a journey through Britain's lost landscape* (Granta Books, 2014) is published in paperback this month, Price £10.00. "... a stunningly good book which combines beautiful writing with a passion for geology and the lost landscapes of Britain." *John Gribbin*. "In the minds of its practitioners, geology is a noble instrument of inquiry and conviction. It can be oracular still, fiercely warning us against the degradation of our planet, and in the hands of Ted Nield it edges its way towards art." *Jan Morris, Literary Review*

## DISTANT THUNDER

## Glorious mud!

**As geologist and science writer Nina Morgan discovers, geologists are not the only ones who love mud**

In 2011 the Geological Society held a meeting to celebrate Poetry and Geology. This year the Society is waxing poetical about mud. "Mud represents both an end and a beginning – the end of the cycle of erosion and transport, and the beginning of the generation (through burial and transformation) of new materials of great value to society," reads the notice on the Events page of the website.

These are two topics close to the heart of Liberty Hyde Bailey (1858-1954). As a child, Bailey apparently loved playing with stones – but he also loved plants. In the end, plants won.

Mentored by American botanist Asa Gray [1810-1888], who corresponded with many in the Geological Society, Bailey went on to focus his prodigious talents on botany, and helped to create the science of horticulture. But his interests were very wide.

He corresponded with Darwin as a supporter of Darwin's *Origin of Species*, and once entertained Alfred Russel Wallace when Wallace visited the Michigan Agricultural College. Bailey was also a prolific writer, rural sociologist, philosopher and environmentalist. He wrote poetry too, and fully appreciated the importance of mud – a sediment he celebrated in verse in his collection of poetry entitled *Wind and Weather*, first published in 1916:

### **Mother Mud**

*Ye rolls of mud! On slag and road  
On wallowed track and slipping yard  
Down millioned years of slash and goad,  
Ye be the earth's first honor-guard. [sic]*

*Clean scurf and rain, by heaven mixed  
Forth-destined when the orb was flung –  
Within the quick'ning sludge transfixed  
Were all the songs the years have sung.*

*No sprout of earth, no winnowed soul  
No singing sphere, no god of man  
Except from out your brooding shoal  
Had ever winged their master-span.*

*Flush sloughs of mud! In fragrant dawn  
Is leaping spring and garnered fall  
I tribute bring to breed and brawn  
Nor dare defile one mire withal.*

*Flow down ye rains to earth far-long  
Rise up ye lands to wind and rift  
When ye be strong then all be strong  
Full-free of doubt and stain and shift*

*For from the sleech the strong ones come;*

*And ev'ry bird and hoof and bud  
In godly part and sacred sum  
Proclaim the kinship of the mud*

Though he could never be said to be a geologist *sensu stricto*, Bailey's celebration of mud must surely qualify him as an honorary geologist at least!

### ➤ Acknowledgement

This vignette was inspired by the gift of a 1919 edition of Bailey's book *Wind and Weather* rescued from a box of his books recently rediscovered in storage near the orchards at Cornell University College of Agriculture and Life Sciences, in Ithaca, New York, US. Other sources of information include an obituary of Liberty H Bailey, published in the *New York Times* on 26 December, 1954; and a Biographical Memoir of Liberty Hyde Bailey, 1858 -1956, by Harlan P Banks, published by the National Academy of Sciences, Washington DC, 1994.

# OBITUARY MICHAEL JOHN O'HARA 1933-2014

**M**ike O'Hara was one of the leading petrologists of his generation.

It has been said that modern igneous petrology and geochemistry would not be the same without Mike's many discoveries, creative efforts, and deep insights. He pioneered the use of experimental and theoretical petrology to unravel the processes involved in the formation of the ocean crust from the underlying mantle.

He was also one of the original Apollo scientists who investigated the rocks returned from the Moon. He was awarded the Murchison Medal of the Geological Society of London and both the N L Bowen and Hess Medals of the American Geophysical Union for his contributions to petrology and his "outstanding achievements in research of the constitution and evolution of the Earth and other planets".

## Passport

Mike was born in Sydney, Australia in 1933. This led Ted Ringwood, his great Australian rival in subsequent debates on the origin of the Moon, to threaten "to get his passport revoked". The family moved to England when Mike was just one year old. At the outbreak of war in 1939, Mike's father was stationed in Pwllheli in North Wales, where he was brought up. On Good Friday 1945 his Mother took him to the funeral of David Lloyd George on the banks of the

**Professor at Aberystwyth, Cardiff and Edinburgh, responsible for implementing the 'Oxburgh Review'**



River Dwyfor near Llanystumdwy in Eifonydd, North Wales. This was to presage a long association with Wales and lifelong support for Welsh rugby.

Mike went up to Cambridge in 1952 and joined the Spitsbergen expedition in 1953. This started a life-long love of mountaineering. He was persuaded to follow a career in geology rather than becoming a mountaineering instructor by Stuart Agrell, and studied at Cambridge (under C E Tilley) for his PhD on the high pressure-high temperature Scourie gneiss.

He moved to Edinburgh in 1958 to continue his research with Arthur Holmes and Fred

Stewart. In 1962-1963 he was awarded a Fulbright Scholarship at the Geophysical Laboratory at the Carnegie Institute in Washington. He spent the year with Frank Schairer and Hat Yoder. He returned to Edinburgh in 1963 where he established a high pressure-high temperature laboratory to study igneous petrology. He was awarded a personal Chair in Edinburgh in 1970 and was elected a Fellow of the Royal Society of Edinburgh.

## Aberystwyth

In 1978 he moved to Aberystwyth where he chaired the Geology

Department. He was elected Fellow of the Royal Society in 1981. He spent two years at the Sultan Qaboos University, Oman in 1988-1990 before moving in 1994 to Cardiff where, as he wrote: "an outstanding late-career opportunity... illuminated my last decade". As Distinguished Research Professor he spearheaded a new world-class petrology group that included inter alia Julian Pearce, Yaoling Niu and Chris Macleod.

Mike O'Hara was a full member of the University Grants Committee (UGC) and chaired the UGC Earth Science Review National Committee during 1986-1988, which shaped the modern form of UK University geoscience. His contribution to the Cardiff School of Earth and Ocean Sciences helped establish the department as a major international centre for research and teaching in the Earth Sciences.

Michael John O'Hara's scientific success lay in his vision and an approach that did not follow bandwagons but continually challenged tradition and authority. He was a likeable and approachable man who hid his great scholarship and intense concern about the subject under a veneer of humour. Many Earth scientists worldwide owe much to his unstinting encouragement and advice. He will be greatly missed.

► By **David Rickard**





## ENDORSED TRAINING/CPD

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

## DIARY OF MEETINGS MAY 2015

MEETING	DATE	VENUE AND DETAILS
Mapping the Earth - Lyme Regis Fossil Festival	1-3 May	See website for links, details and registration.
RCMNS Interim Colloquium 2015, Mediterranean-Atlantic Gateways (Neogene-present). Medgate, IODP Expedition 339	5-8 May	Venue: Rabat, Morocco. See website for details and registration
Groundwater in Africa: Is There Enough to Go Around? Southern Wales Regional	12 May	Venue: Wallace LT, Cardiff University. Time: 1800 for 1830. Speaker: Prof. Alan Macdonald (BGS). E: <a href="mailto:swales.rg@geolsoc.org.uk">swales.rg@geolsoc.org.uk</a>
River Dredging Geological Society	13 May	Venue: Burlington House. Speaker: Neville White (Environment Agency). Society London Lecture. See p. 6 for details.
Modelling Groundwater in the Urban Environment - Processes and Problems. Hydrogeological Group	13 May	Venue: Priory Rooms, 40 Bull Street, Birmingham. Time: 0930-1600. See website for details and registration. Fees apply.
4th Annual Asia Pacific Small to Midscale LNG APAC	13-15 May	Venue: Singapore Marriott Hotel, 320 Orchard Rd, Singapore. See website for details and registration. E: <a href="mailto:info@apaclng.com">info@apaclng.com</a>
9th International Industrial Minerals Symposium 2015. TMMOB Chamber of Mining Engineers of Turkey & Dokuz Eylul University	14-15 May	Venue: Izmir, Turkey. See website for registration & details. E: <a href="mailto:indmintr@deu.edu.tr">indmintr@deu.edu.tr</a>
Sedimentology of Paralic Reservoirs: Recent Advances and their Applications. Petroleum Group	18-19 May	Venue: Burlington House. Fees apply. See website for registration & details. E: <a href="mailto:laura.griffiths@geolsoc.org.uk">laura.griffiths@geolsoc.org.uk</a>
Canada LNG Export DMG Events	19-21 May	Venue: Calgary TELUS Convention Centre. See website for registration & details. E: <a href="mailto:neillhoward@dmgevents.com">neillhoward@dmgevents.com</a>
Near Surface Geophysics as used in Geotechnical Site Investigations. Western Regional	19 May	Venue: Reynolds Lecture Theatre (Room G25), Earth Sciences, Bristol University. Time: 1800 for 1830. Speaker: Dr. Simon Hughes - TerraDat UK Limited. See website. E: <a href="mailto:westernregionalgroup@gmail.com">westernregionalgroup@gmail.com</a>
Urban Geology in Wales Southern Wales regional	19 May	Venue: Cardiff University, ROOM 1.25 Main Building. Time: 1730 for 1800. Speakers: Doug Nichols, Dr Richard Bevins, Sergio Solera and Ray Kenny. E: <a href="mailto:swales.rg@geolsoc.org.uk">swales.rg@geolsoc.org.uk</a>
Sustainable exploitation of the subsurface Geological Society. EGGS. IAEG	20-21 May	Venue: Burlington House. See website for registration & details. E: <a href="mailto:jess.aries@geolsoc.org.uk">jess.aries@geolsoc.org.uk</a>
The Quaternary of the Lake District QRA	21-24 May	Venue: Blencathra Field Studies Centre, Threlkeld, Keswick, Cumbria CA12 4SG. See website for registration & details. E: <a href="mailto:d.mcdougall@worc.ac.uk">d.mcdougall@worc.ac.uk</a>
Implementing geological disposal of higher activity radioactive waste Northern Ireland Regional	21 May	Venue: Wellington Park Hotel, Belfast. Time: 1330 for 1400. Lecture. With Radioactive Waste Management Ltd. Contact: Mike Young E: <a href="mailto:GeoSocNI@gmail.com">GeoSocNI@gmail.com</a>
The story of the rocks: William 'Strata' Smith's geological map at the Yorkshire Museum. The Yorkshire Museum, York	22-31 May	Venue: The Yorkshire Museum, York. See website for details, links & registration.
Finding Oil in Atlantic Basins Finding Petroleum	27 May	Venue: Royal Society of Chemistry, Burlington House. Fees apply – see website. Contact: Natalie Cronshaw E: <a href="mailto:natalie@findingpetroleum.com">natalie@findingpetroleum.com</a>
Groundwater Modelling for Mining: two day training course EDUMINE	28-29 May	Venue: EduMine, 530 Hornby Street, Vancouver, BC Canada. Training course. See website for details and registration. E: <a href="mailto:edumine-support@infomine.com">edumine-support@infomine.com</a>

## STICKS AND STONES



Dalston & Gibbet are unwell, having been injured while designing a wheelchair-friendly field excursion.

# OBITUARY JOHN CROOK 1933-2014

**J**ohn Crook's career reveals a well-regarded geologist, who worked from 1955 on major geological mapping projects in Africa and the Middle East. From 1972 until 1990 he was deeply involved in research on, and the utilisation of, the increasing information becoming available from satellites and the development of remote sensing.

John (pictured, standing) graduated in 1955 from the then Kingston Technical College, with a 1st Class Honours Geology Degree. He became a Junior Associate of the Geological Society in 1952 and was elected Fellow on 23 November 1955.

## Ghana

In 1955, John married Rosemary Smithers, and they spent the next 10 years in Ghana. John's field mapping was in the Volta region for the Geological Survey of Ghana. His maps and reports were published by the Survey and also reported in *The Mineral and Rock Resources of Ghana*, by G O Kese. John also contributed to the papers of Richard Holm on the Dahomeyan gneiss in the western Accra Plains, Ghana.

The opportunity to join Hunting Geology and Geophysics Ltd arose in 1966. Huntings had been established in 1952 and provided an increasingly wide range of services to oil and mining

## Geologist with Hunting who worked on major mapping projects in Africa and Middle East



companies, the United Nations and governments. John was an important leader of many teams, and in time was appointed an Associate Director.

To illustrate John's work I have selected just two projects, which demonstrate his wide experience and managerial skills.

In 1977, Huntings were awarded the contract to undertake geological mapping and mineral exploration in three large areas of basement rock in southern Libya. Since there were no maps or roads in the area Huntings resorted to using the earliest ERTS (now Landsat) imagery to navigate

across the Sahara. This was a typical large-scale project where the Huntings' geologists were responsible for not only the technical work but also overcoming massive logistic problems. In such projects John provided essential support and was a friend and mentor to many geologists.

## Humour

It is a measure of John's modesty that he didn't talk of himself and never complained of difficulties in the field, in spite of bouts of serious migraine. He had a fantastic sense of fun and humour. Almost every day he had a joke to tell to lift the

mood, whatever the circumstance. His honesty and selflessness and kindness to all brought out the best in all who worked with him. He made everyone feel part of the team and always offered careful considered advice and help with our tasks, however much we needed to know.

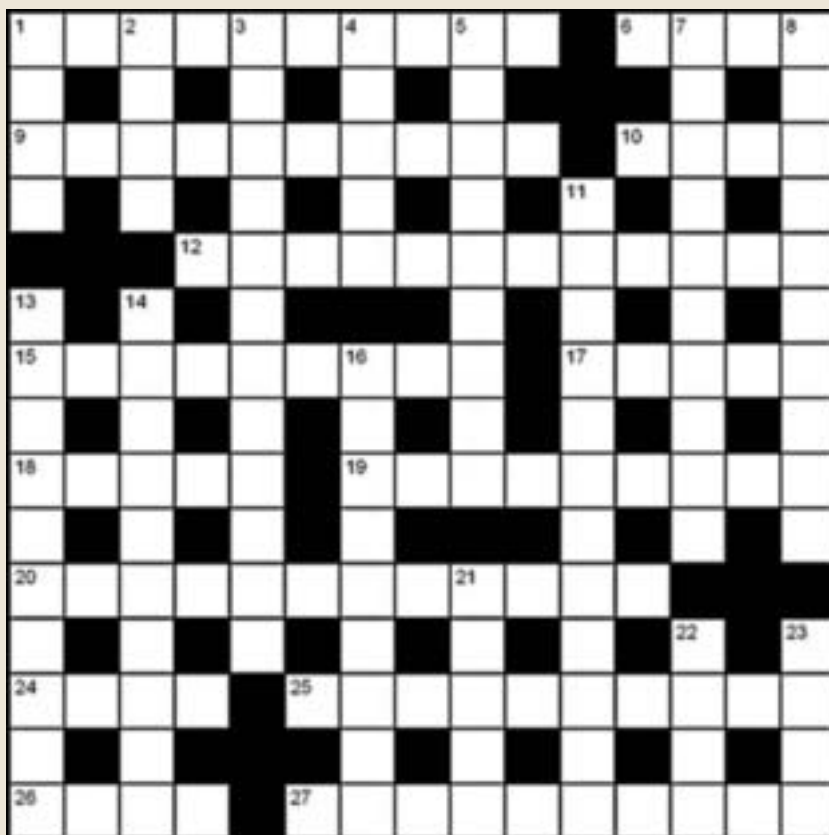
In November 1985, Huntings were awarded the contract to support the NRSC in its mission to promote the use of remote sensing in Britain and by British companies working overseas. It did this by undertaking pilot projects using remote sensing in agriculture, geology, oceanography, forestry, urban planning and disaster monitoring, testing and planning for new sensors.

John Crook was appointed Project Manager, and managed a team of scientists together with support staff. The team became widely respected in the industry, and broke new ground in many fields, for example: using multi-band thermal imagery in geology, and monitoring opencast mines, oil slicks and bush fires. John was a humorous, calm and fairly 'hands-off' but very supportive manager of the project. The project continued to the end of 1990.

Subsequently John and Rosemary retired to Harrogate in Yorkshire. John is survived by his widow Rosemary, their two children, Andrew and Susan, and five grandchildren.

► By Derek Morris



**CROSSWORD NO.189** SET BY PLATYPUS**ACROSS**

- 1 Highest grade of coal (10)
- 6 Cain's brother, confused, was not, whereas Cain alas was. (4)
- 9 'Thunder lizard' of which everyone has heard and has recently made a comeback (10)
- 10 Acronym for the rock erupted at spreading centres beneath the wave (4)
- 12 With malice aforethought (12)
- 15 Manoeuvre performed by space probes which use the gravitational pull of celestial bodies to increase their speed (9)
- 17 Iron-carbon alloy (5)
- 18 The man who found and kept his marbles, in contrast to most of us (5)
- 19 Ceaselessly bothering and nagging a co-worker (9)
- 20 Lying, in relation to the matter in hand, as a straight line to the circumference of the circle it touches (12)
- 24 Cheek, or if you prefer, 3,4-methylenedioxymphetamine (4)
- 25 Variety of cryptid 'snowman' said to inhabit the Himalayas (10)
- 26 Middling (2,2)
- 27 County extending from Strathmore to the Pass of Drumochter, Rannoch Moor, Ben Lui and Aberfoyle (10)

**DOWN**

- 1 Acronym for a new qualification awarded by the courts since 1998 to Britain's most distinguished naughty people (4)
- 2 Bathsheba Everdene's dashing Captain (4)
- 3 The lithostratigraphic 'Underlying Red', Germanically (12)
- 4 Well with lining (5)
- 5 Cut short (9)
- 7 The creation of life (10)
- 8 Study of the development of the fertilized egg (10)
- 11 Orthographical faults (12)
- 13 Industrial disease caused by fibrous mineral (10)
- 14 See 7D (10)
- 16 Capable of sustaining life (9)
- 21 Allow into the student body (5)
- 22 Place of shelter in France (4)
- 23 Famous Shoemaker (4)

**WIN A SPECIAL PUBLICATION!**

The winner of the March Crossword puzzle prize draw was **Jonathan Scafi of Haywards Heath, UK.**

All correct solutions will be placed in the draw, and the winner's name printed in the July 2015 issue. The Editor's decision is final and no correspondence will be entered into. **Closing date - May 22.**

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

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

Name .....

Membership number .....

Address for correspondence .....

Postcode .....

**SOLUTIONS MARCH****ACROSS:**

1 Epigenetic 6 Lima 9 Avalanches 10 Even  
12 Athletically 15 Caenozoic 17 Oaten  
18 Amino 19 Allophone 20 Exemplifying  
24 Ruin 25 Equanimity 26 Lass 27 Centigrade

**DOWN:**

1 Eras 2 Iran 3 Enantiomorph 4 Excel  
5 Identical 7 Involution 8 Annoyances  
11 Accompanying 13 Octahedral 14 Refineries  
16 Odalisque 21 Yeast 22 Mica 23 Dyne

# EARTHWORKS

[www.earthworks-jobs.com](http://www.earthworks-jobs.com)

More than 365,000 unique users per month point their browsers to [www.earthworks-jobs.com](http://www.earthworks-jobs.com) to see the latest, worldwide, research, academic and professional jobs in the Geoscience, Environmental, Engineering, Water, Mining and Oil & Gas Sectors.

Advertisers e-mail copy to  
[copy@earthworks-jobs.com](mailto:copy@earthworks-jobs.com)  
for publication within 2 hours of receipt,

call +44(0) 1223 900342



**Earthworks-jobs.com**

# Rocks, Routes & Shoots

A geology and ecology tour of Kashmir and Ladakh

Led by Heather Kelly and John Macgillivray 27 June - 12 July 2015

**£85  
DISCOUNT!**  
for Geological  
Society of London  
members



Join geologist John MacGillivray and ecologist Heather Kelly in July 2015 for a tour to Kashmir and Ladakh in the NW Indian Himalayas, looking at the geology and ecology of the area and how people live in, and interact with, their fragile environment.

- Explore spectacular landscapes • Visit high altitude lake Pangong Tso • Unique geology and topography • Glacial moraines and hanging valleys, sediments layered and folded on a massive scale and metamorphic and igneous rocks of every hue • Discover how plants have had to adapt, and how they are used both for food and shelter • See wildlife in abundance • Visit Buddhist monasteries, excellent vantage points for geologists.

Enquiries and bookings: T: 020 8901 7320

E: [holidays@indusexperiences.co.uk](mailto:holidays@indusexperiences.co.uk)

[www.indusexperiences.co.uk/earthsciences](http://www.indusexperiences.co.uk/earthsciences)



**INDUS  
experiences**  
THE TAILOR-MADE HOLIDAY SPECIALISTS

Contact us for Geology, Geography and Ecology field trips to India, Nepal and Bhutan




Corporate Supporters:

bp  
Statoil

In collaboration with:

Geological Society of London  
Petroleum Group

Convenors:

Jonathan Craig  
President of the Petroleum History Group

Jeff Spencer  
President of the Geological Society History of Geology Group

Richard Moody  
Rockhopper Exploration and Geological Society Petroleum Group

Fiona MacAulay  
Rockhopper Exploration and Geological Society Petroleum Group

William Brice  
Petroleum History Institute

Rasoul Sorkhabi  
Energy & Geoscience Institute, University of Utah and Petroleum History Institute

Call for Abstracts – 1 June 2015

## European Oil & Gas Industry History conference

3-4 March 2016  
Burlington House, Piccadilly, London





This joint conference between the Petroleum Group of the Geological Society, the History of Geology Group of the Geological Society and the Petroleum History Institute will be held in London in March 2016. It will mark several important anniversaries including 150 years of oil exploration in Poland & Romania, the centenary of the drilling of the first oil well in the UK and 50 years of oil production onshore Spain. The focus of the conference will be to examine the history and heritage of the oil and gas industry in Europe from the earliest onshore drilling (and digging) to its development into the industry that we know today and also to examine the transition from conventional to unconventional resource plays in the onshore arena.

**Associated Events:**  
A fieldtrip will be arranged over the weekend following the conference to examine the history, industrial archaeology and geology of the UK's earliest oil and gas fields in the east Midlands and the Peak District. During the trip a memorial plaque and information board will be unveiled at the Hardstoft-1 well site in Derbyshire, marking the 100th Anniversary of the drilling of the well under the defense of the Realm Act to reduce Britain's dependence on oil imports.

**Call for Abstracts:**  
Please email paper and poster contributions to [laura.griffiths@geolsoc.org.uk](mailto:laura.griffiths@geolsoc.org.uk) and copy to [fiona@rockhopperexploration.co.uk](mailto:fiona@rockhopperexploration.co.uk) by 1st June 2015.

**For further information please contact:**  
Laura Griffiths: The Geological Society, Burlington House, Piccadilly, London W1J 0BG. T: 020 7432 0980 or email: [laura.griffiths@geolsoc.org.uk](mailto:laura.griffiths@geolsoc.org.uk)

*At the forefront of petroleum geoscience*  
[www.geolsoc.org.uk/petroleum](http://www.geolsoc.org.uk/petroleum)

## Arthur Holmes Meeting 2016

### The Wilson Cycle: Plate Tectonics and Structural Inheritance During Continental Deformation


23-25 May 2016    The Geological Society, Burlington House, London, UK

**Thematic sessions include:**

- The Wilson & Supercontinent cycles - how well do they work on a global scale?
- Lithosphere scale & deep earth dynamics
- Reactivation and reworking during the rifting, break-up and orogenesis
- Long-term weakening processes during continental deformation
- Regional themes & case studies

**Convenors**

- Woody Wilson (BP Exploration, UK)
- Ken McCaffrey (Durham University, UK)
- Tony Doré (Statoil [UK] Ltd, UK)
- Greg Houseman (University of Leeds, UK)
- Leigh (Wiki) Royden (Massachusetts Institute of Technology, USA)



This meeting will mark the fiftieth anniversary of Tuzo Wilson's landmark paper asking "Did the Atlantic close and then re-open?". This paper was one of a series of papers which led to the "Wilson Cycle" concept, in which the repeated opening and closing of ocean basins along old orogenic belts is a key process in the assembly and breakup of supercontinents. This implied that the processes of rifting and mountain building somehow pre-conditioned and weakened the lithosphere in these regions making them susceptible to strain localization during future deformation episodes.

**Call for Papers**

We welcome both oral and poster presentation contributions from both surface and sub-surface settings for this meeting. If you would like to submit a paper to the meeting, please send an abstract of no more than 400 words to Jess Aries. A Geological Society special publication is planned containing papers linked to presentations at the meeting.  
E: [jess.aries@geolsoc.org.uk](mailto:jess.aries@geolsoc.org.uk)

**Oral Abstract Deadline: 18 December 2015**

**Further information:**  
For further information about the conference please contact:  
Jess Aries, Conference Office, The Geological Society, Burlington House, Piccadilly, London W1J 0BG. T: 0207 432 0983. E: [jess.aries@geolsoc.org.uk](mailto:jess.aries@geolsoc.org.uk)  
W: [www.geolsoc.org.uk/ahm16](http://www.geolsoc.org.uk/ahm16)



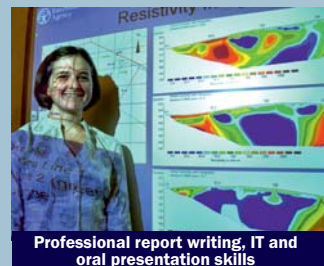
# M.Sc. Applied Environmental Geology

The School of Earth & Ocean Sciences at Cardiff University are proud to celebrate the 25th anniversary of their professional vocational Postgraduate Taught Masters degree in Applied Environmental Geology.

The degree programme was started in 1990 as a response to the demand for a professional training programme for geo-scientists employed on designing urban regeneration schemes like the Cardiff Bay redevelopment programme. The Masters-level training course covers the multi-disciplinary skills required by the modern applied geo-scientist, particularly in site investigation, contaminated land assessment, determining an accurate conceptual ground model for ground engineers, all in the context of UK/European codes of practice and environmental legislation. Over 25 years, 700 of our postgraduates are now successfully employed in geotechnical / geoenvironmental consultancies and government agencies in the UK, Europe and overseas.

The 12 month degree comprises of two stages :

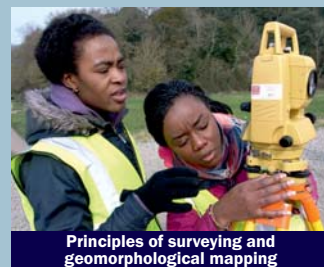
## Stage I: The Taught programme (October - March)



Professional report writing, IT and oral presentation skills



The chemistry of contaminated land and environmental impact



Principles of surveying and geomorphological mapping



Geotechnical engineering & site investigation methodology



Environmental geophysics



Engineering behaviour of soils & laboratory testing



Water in the environment



Site investigation by practical project training exercises

## Stage II: Applied Research/Dissertation (May - September)

Individual student applied research projects, where we endeavour to place students wherever possible with data-rich, real-world projects, in collaboration with UK consultancies and Government agencies.



The Masters-level course is run in collaboration with professional consultancies in Wales and the West of England. The Geological Society of London accredited programme includes case-study lectures by invited experts and is integrated with the CPD programme of the Southern Wales Regional Group.

Bursaries of £3000 are now available for postgraduate taught courses at Cardiff University.

Further course details: <http://www.cardiff.ac.uk/earth/msc-in-applied-environmental-geology/>

Apply online at: <http://www.cardiff.ac.uk/for/prospective/pg/apply/sendingapplication/index.html>

M.Sc. Course Director: Dr. Peter Brabham C.Geol Email : [Brabham@Cardiff.ac.uk](mailto:Brabham@Cardiff.ac.uk)



**Coming soon**  
for the 2015 field  
mapping season



**Fieldmove**

**FieldMove for tablet**  
iOS, Android and Windows 8.1