

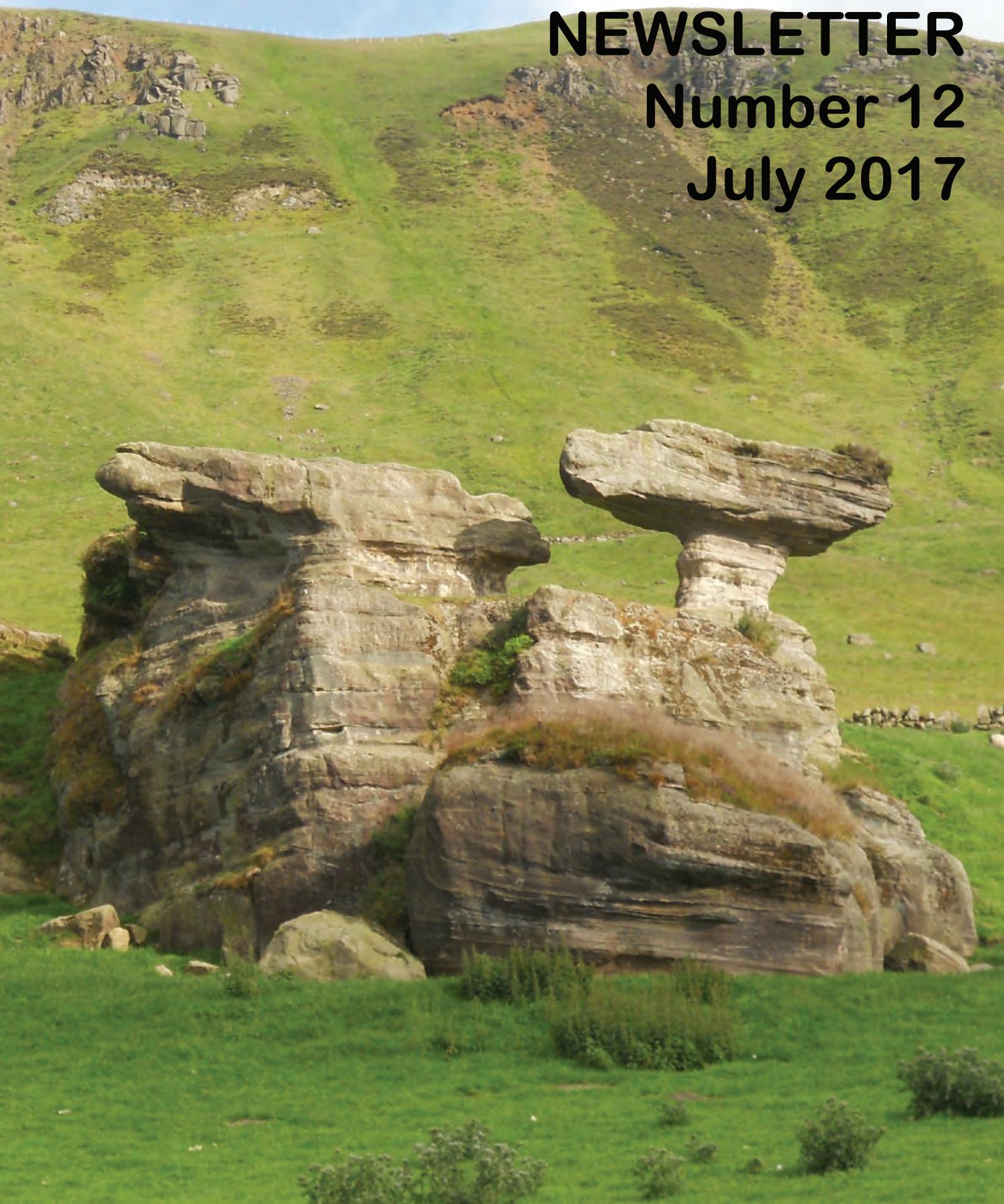
**SCHOOL  
OF  
EARTH & ENVIRONMENTAL SCIENCES**

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University of  
St Andrews

**NEWSLETTER  
Number 12  
July 2017**



**Welcome** to the 12th issue of the Newsletter. This issue contains news of promotions, new appointments, awards and the usual good news which we are good at generating! It is also the first time in the history of Geology at St. Andrews that we have 3 professors.

As usual, I invite alumni to send me news for inclusion in future issues.

Richard A. Batchelor (Editor)

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To all our friends and supporters throughout the many years, by the time you read this it will be official: as of August 1<sup>st</sup>, 2017, Earth and Environmental Sciences became an independent School in the Faculty of Science at the University of St Andrews. Establishing our science, in its own right, within the University sends a message throughout the UK and internationally, and is enormously satisfying - a deeply felt “thank you and well done!” to everyone over the past decades who has worked towards that goal. The strength of our alumni support and the sustained quality of our teaching and research have been central in enabling the School (even as I type “School” it is hard not to think “Department”!) to go from strength to strength and we look forward to your continued commitment in helping to enhance our programmes. As detailed in the pages that follow, the Semester will mark a seamless continuation of that upward journey and we are thrilled to have Catherine Rose and Richard White joining us. So, raise a toast to the birth of the School and to the success of its vision in becoming one of the finest Earth and Environmental Science teaching and research programmes worldwide.

Tony Prave (Head of School)

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## STAFF

### Promotions Bonanza

Hot off the press is that four staff members were promoted this summer. **Andrea Burke** was promoted to Senior Lecturer, **Richard Bates** and **Aubrey Zerkle** both become Readers and **Tony Prave** (currently Head of School) becomes Professor. Congratulations to all of them.



*L to R: Richard Bates (inset), Aubrey Zerkle, Tony Prave, Andrea Burke*

### New appointments



*Catherine*

**Catherine Rose** returned to the School as a Lecturer in August. She graduated with a BSc from St Andrews in 2005 before crossing the Atlantic to complete a PhD (2012) at Princeton University, New Jersey. Her research investigated the Neoproterozoic carbonate and glacial units in South Australia, where she spent over 9 months in a tent in the Flinders Ranges. Catherine then migrated to a lab as a postdoctoral fellow (2012-2014) at Washington University in St. Louis, Missouri, and returned towards home as an Assistant

Professor at Trinity College Dublin (2014-2017). Her research interests involve pairing sedimentary stratigraphic data with a range of geochemical proxies to explore key Earth history events, such as large perturbations to the global carbon cycle and changes in climate. She is currently investigating the impact sedimentology has on isotopic signatures preserved in modern and ancient settings. Catherine is happiest in the field and despite conducting extensive field work in desert regions such as Namibia, Argentina and Oman, she is excited to put on her wet weather gear to lead students to the Scottish outcrops that ignited her passion for geology as a St Andrews undergraduate.

**Richard (Dick) White** takes up the Chair in Geology as Professor. Born in Melbourne and raised in Sydney, Australia, Richard completed a BSc (1991) and MSc (1993) at the University of Sydney. He completed his PhD at Macquarie University (Sydney) in 1997 researching granulite facies metamorphic rocks from the Musgrave Block in central Australia. He held several postdoctoral positions at the University of Melbourne between 1998 and 2007 undertaking field based and mineral equilibria modelling research prior to moving to Mainz, Germany as Professor of metamorphic geology in 2007. His main research interests include the application of mineral equilibria to metamorphic rocks, the development of activity-composition models for minerals and melt, the production and evolution of melt in the crust, open system metamorphic processes and the controls on the development of metamorphic textures. Richard has undertaken field-based research in central Australia, east Antarctica, Southern Africa, the Alps and Scotland.



*Richard (Dick) White*

**Kirsty Stokes** recently joined the School to augment the secretarial support. She joined the University in 2004 initially within Student Recruitment and Admissions as a Senior Administrator (PG Research) before moving to Registry to work primarily with online projects and latterly the Postgraduate Research team. Prior to joining the University, she had roles in finance within the HE sector and as well as being a Pony Stud Manager and Veterinary Nurse. Her hobbies and interests include Ancestral Research, walking and retraining problem horses!

Congratulations to **Ruth Robinson** - her co-authored paper with colleagues earlier this year was awarded Outstanding Paper of the Year for the *Journal of Sedimentary Research*, the premier journal in the field of sedimentology. Their work involved developing a mass balance model for sediment fluxes from source areas to basins using the Cretaceous Interior Seaway geology as a test case.

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Congratulations to **Jonathan Cloutier** for scooping a NERC-CASE PhD studentship. Tim Raub's knowledge of IAPETUS (the

Natural Environmental Research Council's Doctoral Training Partnership initiative that the School is part of) combined with Jonathan's industry-supported project means that the School will have another PhD student starting this Autumn.

Congratulations to **Eva Stüeken** who won her first grant on this side of the Atlantic. The Carnegie Trust is funding her work on using coupled Se and S isotopes to address issues of ocean oxygenation.

### **Sami Mikhail.**

The Geological Society of London has awarded Sami its 2017 Murchison Fund, given annually to a young scientist for contributions to hard rock geology and tectonics. Former Murchison winners include Charles Lapworth (1878), John Dewey (1971), Andrew Mackenzie (1989), and Peter Clift (2005) among others. Sami's research so far has addressed the origin of Earth's atmosphere, of diamonds in its mantle and the crustal evolution of the planet Venus. Sami, with colleagues from the University of Strasbourg, has been studying Venus – the most Earth-like planet in our solar system – to find out why volcanism on Venus is a rare event while Earth has substantial volcanic activity. His research revealed that the intense heat (460°C) on Venus gives it a less solid crust than the Earth's. Instead, Venus' crust is plastic-like – similar to Play-doh – meaning lava magmas cannot move through cracks in the planet's crust and form volcanoes as happens on Earth. Instead the magma gets stuck in this “squidgy” planetary layer. This soft crust also prevents tectonic plates forming as they do on Earth – a geological phenomenon which plays a very important role in Earth's carbon cycle and is crucial to Earth's climate.

### **Claire Cousins**

Claire featured in a BBC2 Horizon programme called *Space Volcanoes* broadcast in May. She was filmed in Iceland collecting

water and rocks samples to look for life forms that can withstand extremes of temperature and sulphide-rich waters.



*Dave McGarvie, Gro Pedersen, Claire, Ian Skilling beside a geyser. (Credits: BBC/ Tom Hayward)*

**Richard Batchelor** was awarded funding from the Royal Society for a project entitled *History and development of the science of geology at St Andrews*. This mostly involves digitising hundreds of photographs, slides, documents, etc. which he has accumulated over many years, and incorporating selected items into a new edition of the *History of Geology at St Andrews*. As Richard stated in his grant application, “St Andrews Geology Department has always punched above its weight”. In addition, he got funding from The Russell Trust to pay for printing a new edition of the *History of Geology at St Andrews*.

### **Ruth Robinson**



*Ruth at her leaving party*

Ruth retired in May after 20 years as Teaching Fellow, Lecturer and Senior Lecturer. She also acted as Director of Teaching for many years. Her lasting legacy will be her creation and development of

*GeoBus*, an outreach programme for schools which introduced pupils to basic geological principles, mostly through hands-on experiments. By the end of 2016, *GeoBus* had interacted with 50,000 pupils across Scotland. The initiative has been variously sponsored by industry and NERC. Ruth was an enthusiastic lecturer and in the field she made the rocks come to life. That zest will be missed by all.

Congratulations to **Chris Sergeant** and **Michael Singer** for winning the *Ignacio Rodriguez-Iturbe publication award* for the best paper in *Ecohydrology* for 2016.



**Elyse Allender** is welcomed to SEES - she will be with us for the next 3 years working on various cameras and spectrometers being sent to the surface of Mars as part of the instrument payload on the 2020 ESA ExoMars rover. Elyse's background is in remote sensing, and she has moved all the way from Tasmania, via a PhD in the USA, to the postdoc office.

Emeritus Professor **John McManus** recently published *Coal Mining in the East Neuk of*

*Fife* (Dunedin Press). The book explores the geology, social history and distribution of the many mines which were dotted around the East Neuk. These were generally small enterprises and did not last long, unlike the larger mines and quarries of central and west Fife. Some mines still show evidence of the former activity (bell pits, drain adits, subsidence). This is his second book on the subject of coal mining in Fife.

Big congratulations to **Sarah Rugheimer** who is part of a team that has been successful in getting not one, but two proposals funded to get time on the Hubble Space Telescope. Sarah's work involves developing protocols and tests for biosignatures on exo-planets.

**Adrian Finch** has succeeded in attracting two grants-in-kind with the NERC Isotope Geoscience Laboratory (NIGL) to undertake isotope geochemistry and geochronology on the Gardar rocks of Greenland. Adrian has spent a long time studying the complexities of that area so a hearty well done!

### **Deep Carbon Science**

More than 150 members of the Deep Carbon Observatory (DCO) Science Network gathered at the University of St Andrews to present forefront research on deep carbon science at the Third DCO International Science Meeting in late-March. The interdisciplinary meeting explored DCO's scientific advances into the quantities, movements, forms, and origins of deep carbon. Organized by the DCO Secretariat, the three-day meeting consisted of intensive oral presentations, poster sessions, and workshops.

During welcoming remarks, Science Program Committee Chair Chris Ballentine (University of Oxford) and local host **Sami Mikhail**, explained the meeting's non-traditional structure, in which early and mid-career scientists would give many of the oral presentations and senior scientists would give many of the poster presentations. This role reversal provided opportunities for all participants to learn about research conducted

by early career scientists during the plenary oral sessions, and facilitated one-on-one conversations between early career and senior colleagues at the poster sessions. A primary motivation for this strategy is that the DCO leadership views its burgeoning early career scientist community as one of the most important legacies of the programme.

The meeting programme, which included approximately 40 oral presentations, 90 poster presentations and five workshops, explored the roles of deep carbon from within Earth's core to outer space. Oral and poster presentations spanned the fields of geology, geochemistry, chemistry and chemical physics, cosmochemistry, physics, microbiology, geomicrobiology and data science.

Speakers presented on topics ranging from the Rosetta space mission and possible origins of Earth's carbon, to diamonds and the myriad forms of carbon in the Earth's mantle, to the role of serpentinisation and hydrogen formation in continental crust. Many DCO colleagues presented their progress toward quantifying and tracing the path of the deep carbon cycle, one of DCO's decadal goals. Researchers shared their work on carbon fluxes to and from Earth's mantle, including the role of subduction of carbon in marine sediments and carbon degassing from subaerial volcanoes, methane hydrates and submarine mud volcanoes.

Many presenters demonstrated the success of using modeling and visualization as a means to synthesise disparate aspects of deep carbon science. In an invited public lecture, DCO Executive Director **Robert Hazen** (Carnegie Institution for Science, USA) showed the power of big data for finding new patterns in vast datasets.

Special mention must be made of the five undergraduate student ambassadors who assisted with the logistics of shepherding 150 delegates around the venues. They also offered an impromptu field excursion for delegates to extol the virtues of the local geology.



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## POSTGRADUATE NEWS

**Ben Taylor.** Massive congratulations to **Ben** for winning a poster prize at the Geochemistry Group Research in Progress (GGRiP) meeting earlier this year! Ben's poster "CO<sub>2</sub> and Circulation: The Deglacial Evolution of the North Pacific" had a well-integrated mix of data and schematic figures. Nice one Ben! Also attending were Jess Crumpton-Banks and Eloise Littlely.

**Matthew Warke** has just joined us as a postdoc on **Mark Claire's** ERC project, and will be around for the next three years. Mark needed a well-trained field geologist, so he did what any sensible person would do and turned to a St Andrews graduate. Matthew obtained a first-class degree from us in 2013 and won the Irving prize twice during his tenure here. He then went to Manchester to do a PhD with Stefan Schröder and has recently defended his thesis on the stratigraphy and geochemistry of the Transvaal Supergroup with implications for the timing and nature of the Great Oxidation Event. Papers are on the way, and we will try to slot Matthew in for a talk on this exciting work sometime soon.

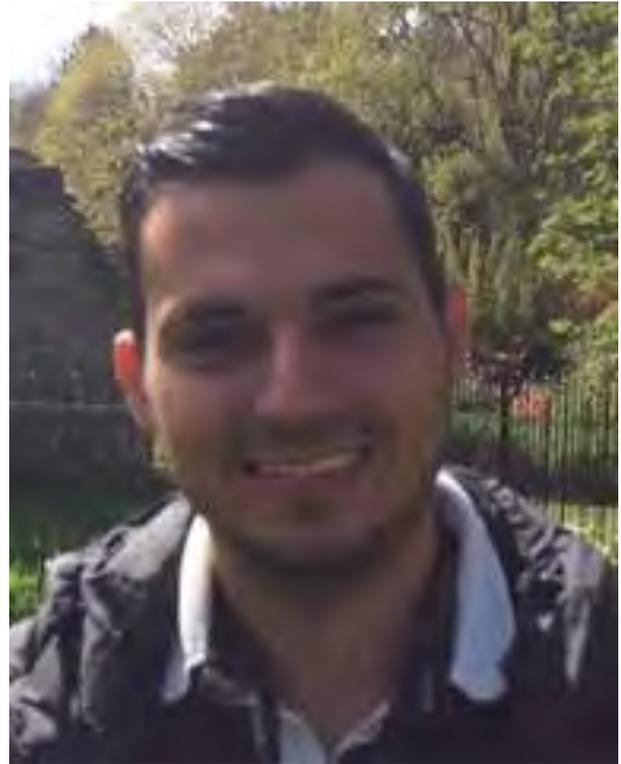
While here, Matthew will work on multiple sulphur and oxygen isotopes as tracers of atmospheric chemistry across geologic time. He will continue to work on creating and interpreting geochemical work based on a strong and careful understanding of stratigraphy, with the challenge of locating specific archives that are likely to contain unusual and/or diagnostic mass-independent signatures.



Matthew

**Fernando Gázquez** started a 2-year postdoc in April. Fernando joined us from Cambridge where he was a postdoc with David Hodell, working on oxygen isotopes in the hydration water of gypsum in speleothems. Before that, he was in Valladolid for an ExoMars related postdoc looking at spectroscopy of cave minerals and did his PhD at the University of Almeria on palaeoclimate records from speleothems.

Fernando is an expert in running the newest isotope machine in the school - The Picarro L-2140i water isotope analyser, which measures  $\delta^{17}\text{O}$ ,  $\delta^{18}\text{O}$ , and  $\delta\text{D}$  to exquisite precision. While the instrument usually runs water samples, he will be working on a methods development project to try and adapt it to work with mineral samples (nitrates, perchlorates, and potentially carbonates). We will try to use this to do some palaeo-atmospheric chemistry on desert soil samples which are otherwise hard to measure using classic techniques.



Fernando

**Eloise Littley** has just passed her candidacy exam! She is here working with **James Rae** and **Andrea Burke** studying the causal mechanisms of Dansgaard-Oeschger events.

**Arola Moreras Marti** was awarded the Best Poster presentation at the inaugural SPERO (Scottish Planetary Science and Research Network, of which the School is a founding member) meeting in Edinburgh in January. Congratulaciones! She is also congratulated for successfully passing her PhD candidacy exam. Arola is working with **Claire Cousins** to assess certain extremophiles as analogues for life on Mars.

**Natalya Zavina-James** has just passed her candidacy exam with flying colors! She is supervised by **Aubrey Zerkle** and is studying the biogeochemical conditions surrounding the Great Oxidation Event.

**Colin Mettam** has had a paper published in *Palaeogeography, Palaeoclimatology, Palaeoecology* and is open access. The title is *High frequency fluctuations in redox*

conditions during the Late Permian extinction event. The paper seeks to marry geochemical evidence and physical observations of changes in trace fossil assemblages and sediment changes.

Readers can access it at:

<https://doi.org/10.1016/j.palaeo.2017.06.014>

**Will Hutchison** has been awarded the inaugural Willy Aspinall Prize by the Volcanic and Magmatic Studies Group. This is an outstanding achievement by Will because the Prize is given in recognition of the finest applied volcanology paper published by a researcher within three years of obtaining their PhD. The criteria are novelty, quality and practical applicability. Congratulations. (Prof Willy Aspinall was a distinguished professor at the University of Bristol and a hazard and risk science consultant).

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## UNDERGRADUATE NEWS

### GeoSoc Presidents, past and present



*Richard Bates, Charlotte Gordon, Mikey van Mourik, Sami Mikhail, Rob Wilson*

During his tenure as President, Mikey lobbied the University to waive fieldwork costs for geology undergraduates, since the field courses are a compulsory part of the syllabus. With help from the Rector, he was successful and, in recognition of his achievement, a small inscribed plaque was presented to him by the current President, Charlotte Gordon.

### E-mail received from departing students

*“On behalf of the graduating Earth & Environmental Science students, we would like to say a huge thank you! Our time at St Andrews has been fantastic and that was only possible because of the warmth, dedication, and passion of the faculty here. It has been an absolute pleasure.”*

*All the very best,  
The 4th/5th-Years.*

### Prizewinners, June 2017

Prizes for various categories of achievements were handed out at a graduation social event in the Irvine Building. Dr Rob Wilson, Director of Teaching, presented the prizes.

**Matt Kaminski** (Irving Prize for best M-Level Student); **Craig Walton** (Irving Prize for Excellence in Field Work (Alps) – 1st Prize); **Jasmine Hansen** (Irvine Prize for Best Field-Based Research Project in Earth & Environmental Sciences & Irving Prize for Excellence in Field Work (Alps) – 3rd Prize); **Savannah Price** (DeCourcy Duggan Prize for Most Innovative Research Thesis); **Craig Martin** (Davidson Award for the Best Performance in Senior Honours Level Earth Sciences); **Joe Cherry** (Irvine Prize for Best Field-Based Research Project in Earth & Environmental Sciences); **Mikey Van Mourik** (DeCourcy Duggan Prize for Most Innovative Research Thesis); **Lanita Gutieva** (Irving Prize for Excellence in Field Work (Alps) – 2nd Prize)



*L to R: Matthew Kaminski, Craig Walton, Jasmine Hansen, Savannah Price, Craig Martin, Joe Cherry, Mikey van Mourik, Lanita Gutieva*

## ALUMNI NEWS

**David Walker** (BSc 1986). "I graduated in 1986 with the class medal and then went on to do a PhD in Edinburgh (sharing an office and supervisor with **Adrian Finch**). After an indirect career path I recently was appointed as an Honorary senior lecturer at St. Andrews in medicine! This is through the global health partnership and NHS Fife with who I have my day job!"

**Gary Gray** (BSc 1978) sent this message. "The title below is misleading, as most of my work is in the environmental field now, though I have just finished a three year secondment as an Environmental Advisor to a big new open cut coal mine up country, which was great fun. The mine geologist was my best friend, as he always appreciated a second opinion on anything out of the ordinary. We geologists / geochemists really have to be 'jacks of all trades' as you well know. Regards from NSW."

Gary Gray, Associate Director – Geologist, **AECOM**, 17 Warabrook Boulevard, Warabrook, NSW 2304

**Peter Jackson** (BSc 1976) has retired from his work in petrochemicals.

Roving reporter **Richard Batchelor** recently met up with three alumni on a recent visit to the British Geological Survey in Edinburgh, where the three alumni work.



*Richard Batchelor with Kirsty Upton (nee Fulton) (BSc 2007), Fiona Fordyce (BSc 1988) and Martin Gillespie (PhD 1989)*

**Kirsty** is a hydrogeologist and **Fiona** works on contaminated soils and water overseas. **Martin** turns his hand to anything: from hot

granites in Scotland to a 3D virtual geology map of Singapore. On a recent visit to Singapore he met up with former St. Andrews geology academic, **Grahame Oliver**.

**Rosalind Garton** (BSc 1978), over the last 2 years, has stood as a Scottish Labour candidate for the Scottish Parliament elections, local council elections in East Fife, and more recently in the General Election for the constituency of North East Fife. She didn't win, but was delighted to have increased the Labour vote by 16% for the General Election.



*Rosalind*



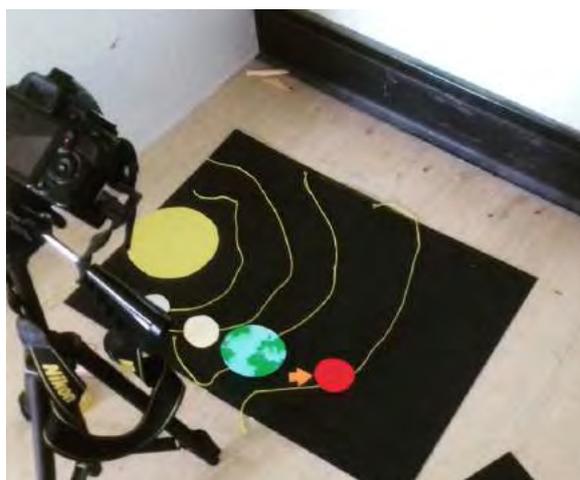
# GEOBUS

Great news for *GeoBus*---the Scottish Government has agreed to fund *GeoBus* to the tune of £20k. This is excellent news for SEES and was all due to **Ruth Robinson** lobbying the powers-that-be at Holyrood.

More congratulations are due to the *GeoBus* team for success in winning a grant from the Edinburgh Geological Society that will help cover the cost of the *GeoBus* Summer Field Camp.

*GeoBus* is extremely sad to be saying goodbye to **Kathryn Roper** who is leaving *GeoBus* to take on a full-time teaching position in Perth. Kathryn has been integral to the running of *GeoBus* over the past five years and she certainly leaves incredibly large shoes to fill, but we wish her all the best and are sure she won't disappear completely! With Kathryn and Ruth leaving, **Claire Cousins** will become the Academic Advisor and **Jen Brooke** will take on the role of *GeoBus* Education Co-ordinator, and **Sean Doherty** will become the new Education Officer. The position of Education Assistant has recently been accepted by **Lauren Hockenull**, who will start with the team in August 2017, following the completion of her Science Communication and Public Engagement MSc at the University of Edinburgh.

As the school holidays are upon us, *GeoBus* is no longer out and about visiting schools but that doesn't mean we aren't still working hard! Along with **Dr James Rae**, we're producing a series of Climate Change resources which will soon be available on our website for teachers to download and use, having had several successful trials including at an 'Eco Day' held in June in a local Fife school. In addition, our hard-working summer interns Alice Thompson (University of Glasgow) and Alice Young (University of St Andrews) have been reaching for the stars as they develop a *Mission to Mars* workshop funded by the UK Space Agency. Delving deep into the mysterious Red Planet, they have been researching the evolution of Mars and how that has shaped the geological features present today, as well as tracing the steps of past and future Mars explorations. Currently under production are several mixed media stop motion Geology-in-a-Minute videos featuring topics including; "Surface Features on Mars", "The Formation of Mars" and "Life on Mars". We look forward to sharing our mission with you as we take off on this project – you can follow along on the *GeoBus* twitter account (@GeoBus\_StA).



*GeoBus* interns Alice & Alice with one of the Rovers, and working on a stop motion animation explaining the formation of the rocky planets.

## Breaking News...

**Jen Brooke** has had her first publication from her thesis published (Bromiley, Brooke and Kohn 2017, *Hydrogen and deuterium in non-stoichiometric spinel*. High Pressure Research **37**, 360-376). In that Jen has spent day and night keeping *GeoBus* roadworthy, this is an achievement worthy of a hearty 'well done!' to Jen.

Thank you to our Principal Sponsors for their continued support. For more information about the project please see [geobus.st-andrews.ac.uk](http://geobus.st-andrews.ac.uk) or contact Jen Brooke ([geobus@st-andrews.ac.uk](mailto:geobus@st-andrews.ac.uk)) or Claire Cousins ([crc9@st-andrews.ac.uk](mailto:crc9@st-andrews.ac.uk)).



And finally, a discovery from the Proterozoic archives.... recognise anyone?



*St Andrews University Geological Society Football Team (Hammers) 1990-1991*  
*BACK, L-R: Doug Cochrane, Norman Armstrong, Donald Herd, Steve McRobbie, Stuart Allison, Dave Lowry*  
*FRONT, L-R: Jon Seedhouse, Dave Cole, Ricky Yarr, Justin Dix, Dave Buchan*

# SCHOOL OF EARTH & ENVIRONMENTAL SCIENCES

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## USEFUL LINKS

<http://earthsci.st-andrews.ac.uk>

<https://www.facebook.com/standrewsgeologyalumni>

<http://soi.st-andrews.ac.uk>

<http://www.cersa.org.uk>

<http://www.geobus.org.uk>

<https://www.st-andrews.ac.uk/development/alumni>

<http://www.st-andrews.ac.uk/development/alumni/reconnecting>

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*Irvine Building*



*The Scores cliffs*

**We are always interested to receive news from our alumni which we are pleased to publish in the Newsletter and the SEES website.**

**Contact the editor: Richard Batchelor ([rab@st-andrews.ac.uk](mailto:rab@st-andrews.ac.uk))**