

**SCHOOL
OF
EARTH & ENVIRONMENTAL SCIENCES**



**NEWSLETTER
Number 11
February 2017**



Welcome to the 11th issue of the Newsletter. The top story is that the Department has been redesignated as a School in its own right (see the Announcement below). This edition has the usual mix of staff, research, students and alumni news.

I have a collection of Honours class photographs going back to 1972, but am missing the following years: 1973, 1975, 1982, 1985. If you have one of these in your possession, may I ask for either a scanned image or a photocopy for my files.

Richard Batchelor

ANNOUNCEMENT FROM NEW HEAD OF SCHOOL

Dear Fellow Geo's

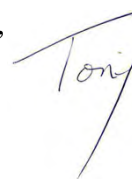
The logo across this Newsletter is not a typo. I am delighted to inform you that on January 1st we became the *School of Earth and Environmental Sciences*. This outcome was a team effort and we acknowledge gratefully Professors Chris Hawkesworth and Peter Clarke who, as members of the University Executive during 2010-15, initiated and helped guide the process of rebuilding Earth Sciences at St Andrews, as well as the University's Principal's Office, particularly Professor Garry Taylor, and Principal, Professor Sally Mapstone.

Our greatest debt of gratitude, though, goes to one of our own, Dr Ed Stephens. From his time as Head of School from 1999-2003 and continuing through to today, Ed provided the leadership and unswerving dedication that kept the Department staying-the-course and enabling us to reach this milestone. To honour his dedication, a tastefully-sized baton of polished granite will be mounted on an oak base with the inscription: *W. "Ed" Stephens Gubernatio, Probitas, Fides*, which will be passed on to successive Heads of School as an icon of and inspiration for steadfast leadership.

You may be asking the question: why now? The short answer is gleaned from two facts. The first is our Staff who are, by any measure, world-class and who are creating one of the finest Earth and Environmental Science programmes anywhere. The second is that we passed a financial stress test: our research income and student number targets are being met, two taught MSc's (Geochemistry, Mineral Resources) are coming on-line, and our summer Field Academy is going from strength-to-strength, so much so that the University is using it as a template to model its other summer school programmes.

Your support has helped us achieve this goal and we look forward to continuing to work together to build a new era of Earth and Environmental Sciences at St Andrews.

Yours sincerely,



Tony Prave
Head, School of Earth and Environmental
Sciences

MESSAGE FROM THE PRINCIPAL

I'm pleased both to introduce myself to alumni as the University's new Principal and Vice-Chancellor, and to recognise the new School of Earth and Environmental Sciences. We look forward to seeing the School go from strength to strength: it is full of dedicated and energetic researchers and teachers, and it also gains much by the support and interest that you show for it. Independence, of course, brings responsibilities, and we will be looking to see the School of Earth and Environmental Sciences compete significantly for external funding and continue to grow the impact of its admirable outreach initiatives. Watch this space!

Professor Sally Mapstone,
Principal and Vice-Chancellor

STAFF NEWS

Colin Donaldson retires

After 38 years as an academic, Colin retired from the University at the end of October last year.

Presentations were made by the President of the students' Geological Society (Mikey van Mourik) and by Professor Cawood.



Mikey and Colin



Peter and Colin

A specially commissioned video, made by Professor Arch Reid (who featured in Newsletter No. 10), was shown and was a personal appreciation of Colin when the two were colleagues at NASA, Houston.

Also at the presentations party was alumna **Rosalind Garton** (BSc 1978) who had been taught by Professor Drever (Colin's PhD supervisor), Bob Johnston (Colin's predecessor) and by Colin himself when he had just arrived in St. Andrews.



Rosalind and Colin

Lotta Purkamo

Lotta is a Finnish Postdoctoral Research Fellow and will be spending the next 2 years with the Geobiology group in SEES investigating the microbiology of super-deep crustal environments in Finland. She is based in Room 510, and even though she's a microbiologist you can see from her photo just how much she loves rocks!



Lotta hugging rocks in Finland

"I'm a geomicrobiologist interested in microbial ecology and astrobiology. I started in the beginning of August in SEES, St Andrews, with a post-doctoral fellowship project called DeepHotMicrobe. The project aims to determine the limits of life in the deep terrestrial crystalline bedrock environment, going as deep as 7 km and to describe the factors possibly hindering microbial life at these depths. Of the outcomes from the project, I hope to evaluate the possibility of emergence and sustainability of life in analogous extraterrestrial environments.

After graduating MSc from the University of Helsinki (2004) in applied microbiology, I worked as a research scientist for several years in a biotechnology R&D company before I decided to pursue an academic career. I received my PhD degree from the University of Helsinki in early 2016. I did my doctoral studies in VTT Technical Research Centre of Finland, concentrating on microbial ecology and functionality in deep, ancient fluids in Finnish bedrock."

Anouk Borst

"My research focusses on the formation and petrogenesis of alkaline igneous rocks and associated rare metal deposits. My BSc and

MSc studies at the VU University of Amsterdam included research projects in planetary geology at the European Space Agency and mantle petrology in Southern Africa. I completed my PhD at the Geological Survey of Denmark and Greenland, investigating the magmatic and hydrothermal evolution of REE, Zr and Nb mineralized rocks in the rift-related Gardar Province, South Greenland. The Gardar Province is home to some of the world's largest critical metal deposits, and provides a world-class natural laboratory to study continental rift systems and magma chamber processes.

At St Andrews I will continue to work on alkaline magmatism and REE transport in the Gardar Province as part of the NERC funded SoS RARE consortium. SoS RARE will bring together mineralogists, geochemists and metallurgists to understand the mobility and concentration of Nd and heavy REE's in natural systems, and to investigate environmentally friendly and economically viable ways to exploit these resources. My contribution will be to study REE behaviour and cycling on a rift-wide scale, using radiogenic isotopes to fingerprint their sources and X-ray, possibly synchrotron techniques, to characterize the paragenesis of their eventual sinks in the most evolved Gardar magma chambers."



Anouk at Narsaq, Greenland

Rhian Rees-Owen

I am a climate scientist, interested in past climate change throughout the Cenozoic and during recent glacial-interglacial cycles. I use a data-model approach, using climate models in combination with geochemical proxies

(isotope and organic) to understand global and regional-scale climate processes, particularly ice-climate-ocean interactions. My PhD focused on past climate and environmental change over Antarctica, when the Antarctic Ice Sheet was significantly smaller than the present day. In particular, I investigated the impact of ice sheet reduction on hydrological cycling and atmospheric circulation.



Here at St Andrews, I am working with **Andrea Burke** and **James Rae** as a PDRA, focusing on abrupt climate change events over the last 30,000 years. Multiple abrupt climate change events occurred during this time period, linked to rapid changes in ocean circulation in the Atlantic. Marine radiocarbon can be used as a tracer of both ocean circulation and carbon cycling during these events. I am using the GENIE Earth System Model to simulate radiocarbon for the glacial climate and stadial events. This research will examine broad patterns of change in Atlantic circulation and associated carbon cycle changes during abrupt climate change.

Will Hutchison

In July and August 2016 members of the HiTech AlkCarb project team (from the University of St Andrews) visited the Gardar Province in South Greenland. The Gardar is an ancient rift zone that was volcanically and tectonically active between 1300 and 1100 million years ago. Although the province is no longer active, it is of major interest to geologists because the subsequent uplift and glacial erosion have cut deep into the rift and

exposed the rocks and magma chambers that once lay well below the surface.

Magma that stalled at upper crustal levels in the Gardar rift evolved to very extreme compositions. This generated high concentrations of incompatible elements, including uranium, thorium, niobium and tantalum in the tops of these magma chambers. As a result, the Gardar Province hosts some of the world's best mineralised magma bodies and our field work aimed to identify the roof zones of these alkaline complexes and understand more about the processes that concentrate the so-called 'rare-earth elements' (REE).

Our focus was the roof zones of the alkaline complexes Ilímaussaq and Motzfeldt. These complexes are only 50 km apart, host significant REE resources and yet their composition and magmatic evolution appears to be quite different. By comparing and contrasting these two unique complexes we wanted to understand whether or not the same underlying processes were taking place.

We were fortunate to have 5 weeks of glorious weather and this allowed spectacular views of the intrusions and detailed sampling surveys to be undertaken. We also had breathtaking views of the fjords, glaciers and mountain ranges of South Greenland. Intriguingly, despite the compositional differences between the Ilímaussaq and Motzfeldt complexes, we found that the magmatic processes taking place in the roof zones were very similar. In both cases we were able to identify sinuous alkaline dykes and sheets penetrating the country rock, and comparable chemical alteration textures were visible around the margins of each intrusion.

We collected a range of geological samples and our next objective is to characterise rigorously their mineralogy and alteration using petrographic and microanalytical geochemical tools. We will develop a set of geochemical indicators for alkaline roof zones and use these new tools to evaluate other complexes in Europe (e.g., Kaiserstuhl, Germany) and understand whether or not

these prospects might offer comparable REE resources to those in the Gardar.

Will Hutchison is co-author on a paper published in Nature Communication based on his work as a NERC-funded D.Phil. student in Oxford. The paper sheds new light on the violent past of several Ethiopian rift volcanoes. Using a combination of field work – to reconstruct the deep history of the volcanoes – and isotopic age dating, the team found that at least 4 of the volcanoes of the main Ethiopian Rift suffered colossal eruptions between about 320,000 and 170,000 years ago. These were very significant eruptions that would have buried the rift floor in volcanic ejecta, disrupting water sources and habitats across wide areas. The collapsed remnants of the volcanic edifices formed great 'calderas', or craters, in the rift floor. The pulse in volcanism coincided with the arrival of *Homo sapiens* in the region around 200,000 years ago and begs the question of the extent to which these changes in the landscape and environments might have influenced human evolution and migration.

Virtual Reality project

A grant of £5000, from the University's Teaching Fund, has been awarded to **Jonathan Cloutier, William McCarthy, Richard Bates** and Alan Miller (Comp. Sci.) to develop virtual reality software for examining geology underground. This project will deliver a virtual three dimensional platform that facilitates immersive learning in underground and enclosed spaces such as caves, mines and buildings. An exemplar teaching space will be built through collaboration between the University and Scotgold Resources Limited. This will enable students to develop the skills needed by geologists in underground environments, which are often remote, highly hazardous and costly to access.

Former DEES Secretary, **Cathy Brown**, visited St. Andrews last autumn and some staff and friends organised a lunch for her at Forgan's restaurant in St Andrews.



L to R: Nicky Allison, Louis, Ruth Robinson, Donald Herd, Stuart Allison, Cathy Brown, Rosalind Garton, Tony Prave, Ed Stephens

Isotope Geoscience Discussion Group

Having toyed with the idea of setting up an isotope geoscience discussion group within the School, especially now that it has reached a critical mass of geochemists, **Paul Savage** has now inaugurated the group (IGDG for short). The inaugural meeting was held at the end of January.

Paul Savage Grant

It is a great pleasure to report that Paul's joint NERC/NSF proposal was successful. The project is entitled: *An investigation of the possible co-evolution of Si and O isotopes in rocks and minerals from the Hadean to present ...just a wee task of sorting out 4.5 billion years of Earth history!*

Eva Stüeken

We welcome Eva as a new staff member who complements the growing expertise in geochemistry.

She writes: "I am interested in the co-evolution of Earth and the biosphere, in particular, in the environmental conditions that led to the origin of life, the invention of particular metabolisms and the rise of complex organisms. I use geochemical tools, including nitrogen, carbon, selenium and sulfur isotopes, combined with sedimentological observations, to characterize biogeochemical cycles in ancient environments and to establish linkages between environmental conditions and biospheric diversity. Another important

aspect of my work is the establishment of selenium isotopes as a new proxy for redox and productivity changes in deep time, which includes the development of new analytical techniques and the investigation of the Phanerozoic selenium cycle."



RESEARCH NEWS

Sarah Rugheimer

Sarah's application to the Simons Fellowship on Collaborations on the Origin of Life, supporting her research with **Mark Claire** on *Modelling Atmospheres: Warming Archean Earth to Detecting Biosignatures*, has been renewed for two years to the tune of \$170k.

Hot Rocks

Applause all round for **Ruth Robinson** and **Richard Bates** on their successful bid to the Scottish Government's Low Carbon Infrastructure Transition Programme for Phase 2, which is part of the Geothermal Energy Challenge Feasibility project for the University's Guardbridge Biomass site. Their work will involve a seismic survey to obtain sub-surface imagery that will be used to guide targeting of aquifers (about 1 km deep). SEES is leading a consortium that

includes Ramboll Energy, Town Rock Energy, BGS and Fife Council.

Aubrey Zerkle, Mark Claire, Colin Mettam et al. had their paper *Onset of the aerobic nitrogen cycle during the Great Oxidation Event* accepted by Nature in November. This an extract from the abstract:

"Our data fill a gap of about 400 million years in the temporal $^{15}\text{N}/^{14}\text{N}$ record and provide evidence for the emergence of a pervasive aerobic marine nitrogen cycle. The interpretation of our nitrogen isotope data in the context of iron speciation and carbon isotope data suggests biogeochemical cycling across a dynamic redox boundary, with primary productivity fuelled by chemoautotrophic production and a nitrogen cycle dominated by nitrogen loss processes using newly available marine oxidants. This chemostratigraphic trend constrains the onset of widespread nitrate availability associated with ocean oxygenation. The rise of marine nitrate could have allowed for the rapid diversification and proliferation of nitrate-using cyanobacteria and, potentially, eukaryotic phytoplankton."

Mark Claire and **Aubrey Zerkle** have been told that the consortium grant they are part of, a ~£1.5M NERC-BERC grant including five UK and eight Chinese universities ("*Ecosystem resilience and recovery from the Permo-Triassic crisis*"), was awarded funding. This is a major multi-proxy cross-correlation effort for the Chinese sections and, in addition to modelling data, there are significant funds for multiple S isotope measurements.

Lotta Purkamo's proposal to the *Deep Carbon Observatory's Census of Deep Life* has been accepted. This will enable her to undertake metagenomic sequencing in the Marine Biological Laboratory in Woods Hole on the samples that she collected from the deep biosphere (2.4km depth) in the Pyhäsalmi mine (Finland).

Richard Bates visits Iran and Namibia

"Hunting the Red Snake, part II - and German Gold!"

The end of the year saw Richard at two very different archaeological projects. The first was back in Iran where he continued to hunt for the remainder of the Gorgan Wall. The Gorgan Wall (the Red Snake) extends from the Alborz Mountains in the east across the Gorgan Plains and was built from the 4th C AD as a defensive structure to keep out the marauding Turks from the north. The wall was constructed of bricks fired from local clay in kilns spaced 40-80m apart along the length of the wall. It was at least 2m wide and tall expanding to a more substantial feature at numerous towers and where defensive forts occurred. To the north of the wall was a 10-30m wide canal, up to 3m deep. Last year the project focused on the southern Tammisheh segment that extended out into the Caspian Sea but this year it was to trace the remaining western part on land. Armed with electromagnetic ground conductivity meters, we managed to trace the wall and ditch a further 8km to the west across an area that has seen much recent geological change including river diversions, beach buildup with sea level rise and the stunning evulsion of sediment as part of a sequence of mud volcanoes.



Mud volcano

The second excursion was of a very different nature – a survey of karst lakes in Namibia to map the underground structures and in so doing help find relics left by the German army as they retreated near the end of WW1. Local stories tell of the German *Schutztruppe* ("protection force") disposing of various armaments in the sinkholes around

the town of Tsumeb. In particular the lakes of Ojikoto and Guinas were suspected to contain artefacts: guns, cannon, ordnance and even (as always in these cases) a safe full of gold!



The survey proved a challenge too much to resist and also a great opportunity to test out some of the multibeam sonar equipment we have been working on for imaging different types of structures. Getting to the site proved quite a challenge in itself with the need to abseil the inflatable boat into the sinkhole before setting up the equipment. The sonar that we used produced fantastic maps of the underground structure showing the bell-like form of the sinkholes and also provided a series of targets for the dive operations. In Lake Ojikoto these were at 30-40m depth and proved to be a carriage gun and boxes of shells however, in Lake Guinas, the depth of over 100m was beyond my comfort dive range and so it remains to be investigated with remotely operated vehicles and cameras. The “expedition” was, in part, sponsored by a US Travel TV channel, so watch out for episodes to be broadcast in 2017 featuring the technology. Unfortunately, no gold yet but we will continue our hunt for the means to support the School's future...!

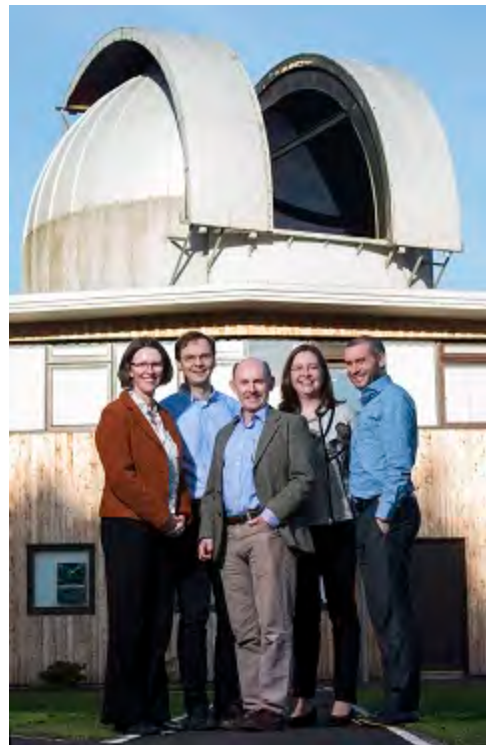


New Centre for extra-terrestrial research formed

Astronomers, Philosophers and Geologists at the University of St Andrews have joined forces in the formation of a new *Centre for Exoplanet Science*. Drawing together experts from disparate fields, the new centre aims to understand the uniqueness of the Earth in light of the many discoveries of other planets. A key component of their work will be the examination of the societal ramifications of such discoveries.

The team aims to find out how planets form in different galactic environments, how their atmospheres evolve, and the relation between the evolutionary history of planets and the emergence of life. They are further interested in the moral, ethical and technical aspects of detecting existent or extinct extra-terrestrial life in distant exosystems, or within our own solar system, and the significance of such a discovery for our societies.

Sami Mikhail from SEES is a member of the team, which is directed by Dr Chritiane Helling (Physics & Astronomy).



Sami Mikhail on right

Rare Earth Elements cause green glow in minerals

In a new paper in *Radiation Measurements*, **Adrian Finch** teases apart the systematics of green glow in the iconic, REE-doped phosphor, strontium aluminate. This long-lasting, intensely luminescent compound is of interest to a variety of materials science applications. Adrian's team shows that its glow peak derives from separate emissions ascribed to Eu^{2+} and Dy^{3+} dopants, which are however co-located and inseparable by conventional analytical techniques. By performing a series of clever thermal, irradiation dose-dependent and fading monitoring experiments, this paper elucidates the kinetics of both the main glow peak and of thermal quenching of $\text{SrAl}_2\text{O}_4:\text{Eu}^{2+}$, Dy^{3+} . Glow appears dominated by electron-trapped Dy^{2+} while thermal quenching seems to involve an electron energy level transition of Eu^{2+} which is distinct from the Eu^{2+} transition responsible for luminescence.

Chithambo, M.L., Wako, A.H., and Finch, A.A., 2017. Thermoluminescence of $\text{SrAl}_2\text{O}_4:\text{Eu}^{2+}, \text{Dy}^{3+}$: Kinetic analysis of a composite-peak. *Radiation Measurements*, v. 97, pp. 1-13.

Atacama salts detected from orbit (from **Mark Claire**)

"I have a long-standing interest in salts in the Atacama Desert and some day I promise to unleash a flurry of publications on such topics as quantitative rainfall palaeoproxies, geochemical and biological heterogeneity across the rainfall gradient, and on finding the driest place on Earth. In the meantime, this super-cool study will have to suffice. Collaborator Jen Harris, based at Birkbeck, UCL, is a whiz at remote sensing and this project was aimed at seeing if the amazingly high salt contents seen in the hyper-arid core of the Atacama could be detected from orbit. She made XRD measurements of soils I had sampled in 2012, and compared these to estimates made from orbit using the Hyperion satellite and quantified against mineral spectral databases. Jen was able to quantitatively determine sulfate

concentrations from orbit, but had a harder time with nitrate and (much lower abundance) perchlorates. Really cool stuff, with relevance to both future work in the Atacama and other deserts, as well as Mars."

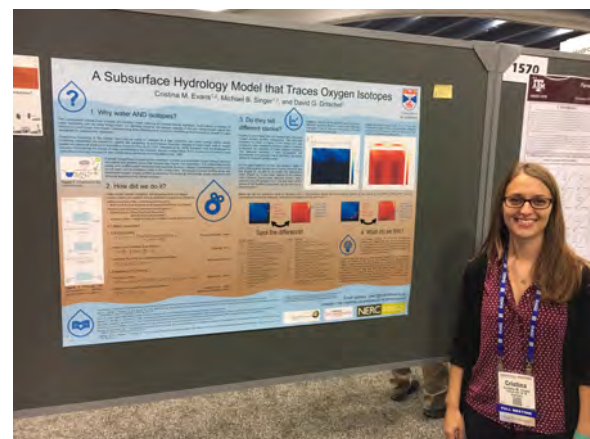
The paper is available at: <http://dx.doi.org/10.1117/12.2241520>

Eva Stüeken publication

Eva is a co-author on a paper, in the Proceedings of the National Academy of Sciences, USA, entitled *Selenium isotopes record extensive suboxia during the Great Oxidation Event*.

"Oxygen is essential for eukaryotic life. The geologic record of early Earth contains abundant evidence of low oxygen levels, and accordingly, a lack of eukaryote fossils. The rise of oxygen to near-modern levels at the end of the Proterozoic Era is thus often cited as the trigger for the evolutionary radiation of complex life forms at this same time. Here we present selenium geochemical data that indicate an expansion of suboxic ($>0.4 \mu\text{M O}_2$) habitats in the shallow oceans between 2.32 and 2.1 Ga - more than one billion years before eukaryotes become abundant in the fossil record. These environments could have harboured the earliest stages of eukaryotic evolution, but may have been too transient for substantial diversification to occur."

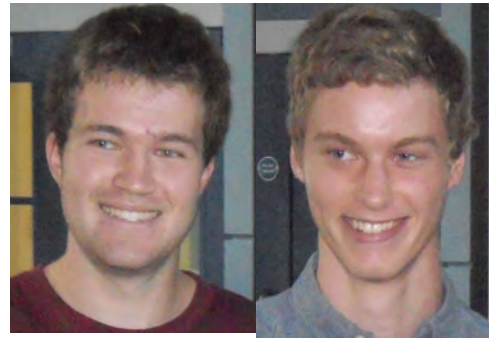
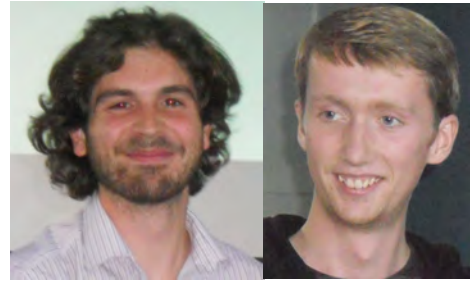
POSTGRADUATE NEWS



Cristina Evans presenting her poster at AGU last December in San Francisco.

UNDERGRADUATE NEWS

There were 12 prizewinners at the beginning of the Autumn Semester: (L to R): Geraldine Tchimbali, Mikey van Mourik, Christopher Fyfe, Andrew Whyte, Lanita Gutieva, Cassandra Ugland, Emily Reid, Emily Madoff, Josh Grinham, Craig Martin, Craig Walton, Ian Cawood.



1st Year class at Chapelness, Earlsferry, Fife



Hearty congratulations are due to six of our undergraduates, Ian Cawood, Charlotte Gordon, Craig Walton, Lanita Gutieva, Emily Madoff and Jordy DeVries who have been successful in winning a *Laidlaw Undergraduate Internship in Research and Leadership for 2017*. These are very competitive awards, which speak highly of the students' efforts and also shines a nice light on the School. Well done.

ALUMNI NEWS

Fiona Menzies née Fraser (BSc 1967, PhD 1977).

While on holiday on the Isle of Mull, **Richard Batchelor** met up with Fiona at her home on the Isle of Iona, where she lives with her husband Gordon. Together they own and manage Iona Gallery (www.ionagallery.com)



Richard and Fiona, with the Ross of Mull granite in the background.

Anna Grayson (BSc 1974)

Anna is using her geological knowledge in the sphere of art.

She writes "Some of your readers may be interested in geologically-inspired artworks. An abstract painting was inspired by studying olivine basalts on Lanzarote, from both the geological and aesthetic point of view. The Lava Tubes there are particularly impressive and that is really what set me off thinking about the fluidity and ubiquitous nature of basalt. I continue to thrive in the world of art. I currently have paintings on show at the South West Academy in Exeter and have been shortlisted again for the Royal West of England Academy in Bristol."



An emotional response to the nature of basalt

Pat Foster (BSc 1974) is generously donating £2400 annually to SEES, a figure which is matched by the Worshipful Company of Grocers, one of the Twelve Great Livery Companies of the City of London, ranking second in order of precedence of 1515.

It plays a significant role in the City's constitutional and ceremonial life, including the election of the Lord Mayor and Sheriffs, and with the valuable industry and support of our members nationwide, it maintains and develops the fundamental ethos embodied in its early Ordinances: 'to be a nursery of charities and a seminary of good citizens'.

Russell Staines (BSc 1993) sent news of a get-together of St. Andrews alumni in Perth, Australia, to celebrate Saint Andrews Day. The night was attended by graduates from many disciplines, with graduates from the early 1960's onwards. Three were geologists and one was a chemist who had studied sub-Honours Geology.

Needless to say, when it came to last orders, only three geologists and one chemist were left at the bar, reminiscing about the great times they'd had as geology students at St. Andrews!



Left to right: Robert Malabar (Chemistry 1984), Doug Brown (1987), Russell Staines (1993), Mike Cunningham (1996).

John Church (BSc 1989) has sent us this report:

"After graduating from St. Andrews, I spent several years wandering somewhat aimlessly and doing a variety of jobs, taking on some more academic study (Imperial College MSc) and doing a lot of travelling. In early 1992, I joined Shell International and initially worked as a geoscientist and, in the latter half of my career, in oil and gas field development management. I have had the good fortune to have been posted to some great overseas locations including Holland, Brunei (where I spent 10 years in 2 stints), the USA, China, Singapore, Indonesia and now in Kazakhstan where I am seconded to a local Joint Venture. My job there is to lead the development of some oil fields in the Caspian. I am married to Siti Noraishah, a Bruneian national, and we have 2 children who now are at boarding school in Scotland."



John standing on the crater wall of the Santorini caldera.

Zhijian (Clancy) Jiang (BSc 2015)

Congratulations to Zhijian (Clancy) Jiang, who recently received a Tang Oxford

Award in Environmental Sciences. Clancy is a 2nd year DPhil student in the Department of Earth Sciences, Oxford University, based at Linacre College. After finishing his degree in Geology at St Andrews, he moved to Oxford to work on palaeoenvironmental reconstruction with Associate Professor Nick Tosca (formerly St Andrews academic). Nick's team uses experimental geochemistry and field geology to tackle the co-evolution of early life and the surface conditions on ancient Earth. Zhijian is from Suzhou in Jiangsu Province, China.

Fergus Gibb (BSc 1963, PhD 1966)

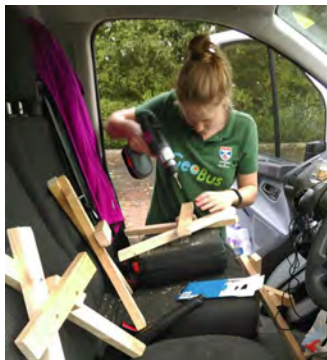
Fergus recently sent us this message of congratulation on the formation of our School. He wrote: *"I was very pleased to pick up from the recent alumni web news the item about the split from Geography. Whatever the nuances of nomenclature, to outside perception it means St A. once more has a 'Geology Department'. It has only taken nearly 30 years to undo the damage of the 'Earth Science Review' which upset so many of us back then. That this has come on the back of your great success in recent years is especially pleasing to me as one of St A's oldest geological old boys.*

*Very best wishes,
Fergus"*

Fergus G F Gibb, BSc, PhD, FGS
Emeritus Professor of Petrology &
Geochemistry, University of Sheffield

GEOBUS

Happy 5th Birthday



Jen Brooke



Jen Brooke, Kathryn Roper, Ruth Robinson, Sean Doherty

Firstly, for those who I have not yet properly met, I'm Jen Brooke and I've been the *GeoBus* Education Officer since July 2016, taking over from Ben Moorhouse when he returned to New Zealand. I completed my undergraduate degree in Geology at the University of Edinburgh, and stayed within the same department to undertake a PhD examining the mobility of hydrogen in mantle minerals – which I successfully defended. During my PhD I took part in a range of outreach activities (including volunteering for *GeoBus* on several occasions) and was also involved in undergraduate teaching, quickly realising that I enjoyed being able to share my enthusiasm for Earth Science with anyone willing to listen.

Having been previously involved as a *GeoBus* volunteer, I thought I had some idea of what to expect when I started, yet somehow the role has so far been even more varied than I anticipated. As Sean so brilliantly described in the previous newsletter it's definitely not a typical job – a standard *GeoBus* day can involve anything from putting together stands for a workshop in B&Q carpark to editing code to make images on the website appear just so!

As you are probably aware, *GeoBus* has marked several incredible achievements over the last couple of months, most notably passing 50,000 pupils taught (now in fact over 52,000) and celebrating 5 years since the project first launched. As part of celebrating this, we launched a new-look website (geobus.st-andrews.ac.uk) with a series of Earth Science education resources – including those recently developed with Dr **James Rae** on Climate Change – which have so far been positively received. We're working towards collating and creating more resources across key Earth Science themes, so if you're interested in getting involved then please let us know.

In addition to the new website and resources, we're working on developing a stronger link between the schools we visit and the research that goes on in St Andrews – including using our social media accounts to allow anyone and everyone the chance to submit questions to 'real' scientists and professionals. If you'd be happy to take over our *Twitter* for a couple of days and answer questions from schools we'd love to hear from you.

After a busy couple of months in the office we're ready to pack up the *GeoBus* and head off around the country!



GeoBus 5th birthday cake.

(L to R): Jennifer Brooke, Kathryn Roper, Claire Cousins (new Director), Sean Doherty

GeoBus is funded by sponsorship and we are very grateful for the support from RCUK, industry and professional societies. At the time of going to press, news has arrived that NERC is continuing to sponsor *GeoBus*.

However, we are currently going through a change in our financial structure and if you are able to support *GeoBus* by making a donation we, and the pupils we work with, would be very grateful. You can do this via the University of St Andrews development office- <https://sparc.standrews.ac.uk/giving/makeyourgift>



'The GeoBus team enjoying a typically non-typical Christmas lunch – a picnic up East Lomond mid-blizzard.'



"If I were asked to select a region in the British Isles where geology could best be practically taught by constant appeals to evidence in the field, I would with little hesitation recommend the East of Fife as peculiarly adapted for such a purpose."

Geikie, A. (1902). The Geology of eastern Fife. Mem. Geol. Surv. G.B.

"While at St. Andrews I was more than ever impressed with the almost unrivalled facilities offered by this centre and its surrounding districts for demonstrating to students many of the fundamental principles of geology".

Geikie, A. (1924). Life's Work. An autobiography. (Macmillan & Co., London).

Sir Archibald Geikie

Director of the Geological Survey of Scotland, 1867 – 1881.

Professor of Geology, University of Edinburgh, 1871 – 1881.

Director of the Geological Survey of Great Britain, 1881 – 1901.

SCHOOL OF EARTH & ENVIRONMENTAL SCIENCES

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>

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

<http://www.st-andrews.ac.uk/alumni/relations/stayconnected/email>

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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)