

**SCHOOL
OF
EARTH & ENVIRONMENTAL SCIENCES**



University of
St Andrews

**NEWSLETTER
Number 14
July 2018**



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.geobus.org.uk>

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

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

CONTACT

E: earthsci@st-andrews.ac.uk

T: 01334 463940

MAIL: School of Earth & Environmental Sciences, Irvine Building, North Street, St Andrews, Fife KY16 9AL

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

Front cover picture: Wave cut platforms at Kinraig, Elie, as seen from the air. (R.E.Garton & J.A.F.Allan)

Welcome

This is the 14th issue of the Newsletter that keeps you up to date with activities within the Earth Science community at St Andrews.

STAFF NEWS

Earlier this year, **Colin Cameron and Donald Herd** each celebrated 40 years of continuous employment, variously in the Department of Geology, Department of Geography, School of Geography & Geosciences and School of Earth & Environmental Sciences. They were presented with a cake each to mark the event.



Colin (centre) and Donald (right)

Sebastian (Batzi) Fischer (newly qualified PhD) was employed, last February, as the new Analytical Labs manager in charge of the XRF, XRD and ICP-MS systems.

Geochemistry Conference

SEES hosted a meeting of *Geochemistry Group Research in Progress* in late-March 2018, at which oral and poster presentations were given. The GG is a special interest group of *The Geological Society of London* and *The Mineralogical Society of Great Britain and Ireland*. Various members of SEES attended to give talks and present posters. Oral presentations were given by **Jess Crumpton-Banks, Aubrey Zerkle, Sami Mikhail, William Gray** and **Nicky Horsburgh**. Posters were submitted by **Richard Batchelor, Anouk Borst, Laura Crick, Adrian Finch, Fernando Gazquez, Rosanna Greenop, Bethan Gregory, Eloise Little, Sami Mikhail, Arola Moreras-Marti, James Rae, Paul Savage, Matthew Warke** and **Natalya Zavina-James**. The event was held in the Gateway Building in St. Andrews.

Teaching Awards

Nicky Allison has been selected as a winner for the Students' Association Innovative Teaching Award while **Jonathan Cloutier** was nominated for an award for Outstanding Teaching.

FRESH Symposium

In early May, the School hosted an afternoon of talks on the topic of Volcanic Impacts on Climate, Environment and Society. Speakers came from the School, BGS, Bristol, Utrecht and Cambridge. **Will Hutchison** organised the event which was well-received by the attendees and by the speakers, who emphasized how friendly and hospitable SEES was, and they were “bowled over” by the fantastic research going on here. **Lesley-Anne Harrison** did a wonderful job managing everything behind the scenes – so a big thank you to her too!

Congratulations to **James Rae** who has been elected onto the Academic Council for the Physical Sciences at the University. He was the only early-career researcher to be selected among a pool of senior academics.

Feel the Burn!

On the 28th and 29th of May, nine research fellows from SEES (**Anouk Borst, David Evans, Mark Fox-Powell, Will Gray, Rosie Greenop, Will Hutchinson, Eleanor Mare, Lotta Purkamo** and **Matthew Warke**) travelled to the Burn estate in Glen Esk for a training retreat. This trip was the perfect chance for the group to reflect on all they had learned during the internal early career researcher (ECR) workshop series that has run for the past year. This workshop series is still ongoing and has been greatly supported by SEES staff, particularly the ECR liaison Sami Mikhail, and has been funded both by SEES and CAPOD.

After a sunny morning drive, the group went for a long hike up the beautiful Glen Esk prior to check-in. While spotting salmon (both dead and alive), frogs and various birds of prey, the group enjoyed their walk over the Highland Boundary Fault and along this classic Barrovian metamorphic section, although they didn't make it much further than the chlorite stage before stopping to dip their toes (and themselves) in the cool, inviting River Esk.

More importantly it was chance for the group to discuss the ins-and-outs of research and get to know each other better.

On Monday afternoon, and into the evening, the group got down to delivering their prepared research pitches. These were based on discussions from previous workshops on funding proposals and everyone in the group greatly benefited from having their ideas critiqued and refined in the friendly atmosphere. Research ideas about global impacts of volcanism, magmatic layering, water on Mars and constraining oceanic Mg/Ca ratios were pitched, in addition to rare earth elements mining from e-waste with microbes, accurately reconstructing glacial sea surface temperatures, global stratigraphic correlations in the Palaeoproterozoic, and the atomic-scale structure of magmas.

On Tuesday, a wrap-up session and a short walk followed a delicious cooked breakfast, and then it was back through the haar to St Andrews. The ECR community would like to thank SEES staff for their continuing support for ECR training and development, and SEES and CAPOD for financial assistance.



The group at The Burn, Glen Esk

Jonathan Cloutier has been elected Fellow of the Society of Economic Geologist. Well done.

Promotions

In the latest round of promotions, the following staff members were elevated.

Nicky Allison to Senior Lecturer, **Mark Claire** to Reader, **Sami Mikhail** to Senior Lecturer and **Jonathan Cloutier** to Lecturer. Congratulations to all of them.

Emeritus Professor **John McManus** recently celebrated his 80th birthday with a party in Cupar. SEES invitees included **Ed Stephens, Richard Batchelor, Rosalind Garton** and former academic **Rob Duck**.



John McManus standing on left

Lotta Purkamo hosted a barbeque at her house to say goodbye to colleagues and friends. Her funded research project has come to an end and she and her family are returning to Finland.



Lotta's farewell barbeque (Lotta is 4th from the right)

Paul Savage

I was invited to give two lectures at a recent Summer School entitled 'Origin of the Earth-Moon system', which ran from 25-28th June. The summer school is part of a DFG-funded (Deutsche Forschungsgemeinschaft) programme entitled 'Late Accretion onto Terrestrial Planets'. It was held in a castle called Burg Reichenstein and I gave two lectures, one entitled "Stable isotopes II basics: tracers of mass-dependent isotope fractionation processes", the other called

"Lunar volatile depletion and mass-dependent isotope fractionation".

Also, in a couple of weeks I will be giving an invited talk at the upcoming European Space Agency (ESA) and Chinese National Space Agency (CNSA) joint workshop on Chinese-European Cooperation in Lunar Science, which will be held in Amsterdam from the 16-18th of July. I will be talking on "New stable isotope insights into the formation and evolution of the Moon."

POSTGRADUATE NEWS

In early March, **Colin Mettam** successfully defended his PhD thesis entitled *Nutrient Cycling and Oxygen Availability in Ancient Oceans: Extinction Events and Evolutionary Opportunities*.

Having successfully defended his PhD, Colin is now working at the University of St Andrews Sea Mammal Research Unit, as part of the Changing Arctic Oceans - ARISE project. He will be analysing stable isotopes in seal teeth in order to contribute to the team's attempts to ascertain any changes in the diet and trophic position of seal populations in response to recent ecological stresses.

www.changing-arctic-ocean.ac.uk/profile/colin-mettam/



Colin Mettam at graduation with his supervisors, Mark Claire (left) and Aubrey Zerkle (right)

Sebastian Fischer graduated PhD at this summer graduation ceremony for a thesis entitled "*Behaviour of zircon and its isotopic systems during intracrustal differentiation.*"



Sebastian Fischer (left) with his supervisor Professor Peter Cawood

Also graduating PhD were **Cristina Evans** and **Chris Sargent**. Well done.

In March, **Adi MacArtney** who was here as Associate Lecturer, successfully defended her PhD from the University of Glasgow with only typographical corrections required by her examiners.

PhD candidacy passes

Laura Crick passed her PhD candidacy exam this week. Well done, Laura! May the coming years be Tobaliciously exciting (as in, explosively interesting volcanic-aerosol ice core S-isotope results, not near-extinction of humankind).

It's been a good week for the first year postgrads as **Jianxun Shen** passed his candidacy exam. He now will be spending the next couple of years figuring out the biogeochemical nitrogen cycle in the Atacama desert (a Mars analogue environment).

Kris Sokol is added to the burgeoning list of first year PGR students who will be continuing on with us. Well done.

Congratulations to **Sarah Boyd** who has just successfully passed her candidacy exam! She will be dedicating the next ~3 years of her life to constraining the role of geology (amongst other things) in controlling isostatic response

to deglaciation. If earthquakes on Antarctica become a regular thing in the coming century, you heard it here first!

Well done to **James Edwards** who passed his PhD candidacy exam. After he develops a new model for oddly-timed gold deposits such as Cononish over the next 2.5 years, we'll all be working for him someday.

Congratulations to **Vincent Twomey** who will be continuing to grace our halls having passed his PhD candidacy exam. We look forward to seeing more of his work on magnetic susceptibility.

Congratulations to **Paul Ross** for successfully passing his candidacy exam. We should look forward to hearing his future predictions about the fate of Scottish pine forests in the face of global change.

UNDERGRADUATE NEWS

The MIS Trust's Young Persons Lecture Competition was held in February 2018.



L to R: David Seath (Secretary), Abigail Robinson, Charlotte Gordon, Edris Joonaki, Bob Laird (President), Jim Wishart (Judge), Ian Cawood, Ed Wade (Judge), Graham Smith (Judge), Lucy Spindler





Class of 2018 in June, with 2 PhD graduands in blue gowns (see under Postgraduate News)

New GeolSoc President

Outgoing GeolSoc President Charlotte Gordon presented the hammer of office to the new incumbent Evan Margerum at the graduation party in June.



Evan Margerum and Charlotte Gordon

ALUMNUS NEWS

Valerie Small (née Carter) 1961

Valerie sent in this brief biography.

"I grew up in Skipton, in the Craven area of Yorkshire. I always had a great interest in the natural world around me and remember school walks as a child where all the flowers had to be identified.

My family always had a strong connection to

Scotland so I was thrilled when I was accepted at St Andrews. Little did I know how much I would enjoy my time there. There couldn't have been a better place for me than St Andrews with its beautiful location, its traditions and long history. However the first time I travelled there, I got off the train at Leuchars to catch the local train to St Andrews. The train arrived, I got on and found I was heading back to Edinburgh! I ended up taking the bus from Cupar. Of course I was late for my first evening meal in McIntosh Hall (Chattan.)



Valerie at St Andrews, 1960

I intended to do Honours Chemistry but took Geology as my second subject. I enjoyed the subject from the start. Saturday morning excursions to look at the local geology increased my interest. I remember finding an agate near Norman's Law on one excursion - I still have it. We went on a field trip to the Isle of Arran in 1958 (where one of our group was injured by a metal sliver from a geological hammer), the North-West Highlands in 1959 (where we had to change our itinerary when our coach threatened to bring down a bridge), the Lake District in 1960 (where we did an eightsome reel on the top of Kirkstone Pass) and Cornwall in 1961. Many happy memories.





Valerie dancing with man in kilt at Kirkstone Pass, Lake District, in 1960. Bagpipes player was Martin Lowe (BSc 1962), who later became Secretary of St Andrews University

Metamorphic rocks eventually became my main interest and so for my Honours research, I mapped the Lewisian inliers around Achiltibuie in NW Scotland. I lived in a butt-and-ben with cows coming into the other room at night. I had many interesting experiences while there. I remember my thrill when I discovered the northern boundary of the main inlier where Torridonian pebbles had crept over the Lewisian gneiss, finding garnets with rims of hypersthene, hornblende and plagioclase feldspar in some of the basic gneisses, and having to leap over what I thought was a snake sunning itself in the heather (I was told later that it was a slow-worm.)

On graduation, I worked for the Geological Survey in Edinburgh (later the Institute of Geological Sciences). After marriage in 1969 and emigration to Canada I worked on various geological projects for Indian and Northern Affairs and for Energy Mines and Resources. I eventually moved into information management and computing and retired in 2013 after 21 years with Fisheries and Oceans."

John 'Ben' Bennett (PhD 1981)

Ben wrote "I noted the article about Atacama Desert in the last newsletter. I toured there in June 2013. I had flown into Antofagasta a day earlier than the rest of the group in order to ride down to see the European Southern Observatory Telescopes at Paranal, passing the Mano del Desierto on the way.

As a copper exporting town, Antofagasta had a strong British presence a century or so ago, as

the clock tower in the centre of town demonstrates".



Chilean and British flags

Ben also visited SEES in May to re-connect with the rocks he had collected and described from Nigeria and Niger in the late 1970's. He met up with **Tony Prave**, **Stuart Allison** and other colleagues during his brief visit. He is hoping to enthuse colleagues here in working on the material which currently resides at the Guardbridge store. Nigeria is a rich source of niobium, tin and tungsten minerals. His visit came at the end of a Munro-bashing holiday in Scotland with his friend and former student here, Charles Abernethy.

John Low (BSc joint Chemistry/Geology 1961)



John Low near Elgol, Skye

I graduated with an ordinary degree in Chemistry and Geology in 1961.

My other subjects were Mathematics and Astronomy. When I first entered the Department of Geology in 1958 the first person I met was **Bob Johnston** and although I did not realise it then, that was the start of a lifelong friendship.

Bob Johnston's lab work on crystals was an inspiration which really shaped the course of my future career and an ongoing passion for crystals.

Having taught for five years as a teacher in the then new comprehensive Kirkton High School in Dundee I decided I had to have a change and applied for a crystallographic job in the Chemistry and Physics department in Dundee University. Bob was one of my referees. I was given the post initially for 3 years. I worked under the supervision of John Iball who had worked with Sir William Bragg at the Royal Institution and Herbert Wilson who was one of Maurice Wilkins DNA research team at Kings in London. After the three years were up, the post was made permanent and apart from collecting X-ray crystal data I had the task of installing, running and writing crystallographic programs on mainframe computers. I completed an MSc and then a PhD in Dundee investigating the structures of biologically active compounds including plant viruses. Dundee University developed a Master's degree in Remote Sensing and I gave a course in remote sensing geology.

We had two research interests: polycyclic hydrocarbons based on benzene, many of which were carcinogenic, and in nucleoside and nucleotides which were related to the components of DNA. As a result of publications in these areas fruitful collaborations with the Chemistry Departments of the University of Aberdeen, the University of Jaen in Spain, Guelph, Canada and St Andrews were developed.

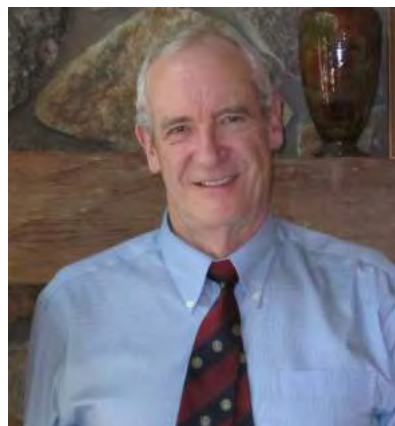
The irony of this is that my organic chemistry was very bad and had it not been for the help of Frank Gunstone in the Chemistry Department my career would not have developed as it did.

After my retirement I was awarded an Honorary Research Fellowship in Aberdeen and I continue to investigate the structures of pharmacologically active compounds with colleagues there and in Porto, Portugal.

As a result of these collaborations my colleagues and I have published the crystal structures of over 1000 compounds in over 500 peer reviewed papers. I pay tribute to all these colleagues, the list is far too long to name them all individually. Without Bob's inspiration and lifelong encouragement this would not have been possible.

[*Editor's note:* Robert "Bob" Johnston began work at St Andrews as a Technician in 1936 looking after the workshop, photography and teaching laboratories. He was promoted to Senior Technical Officer in 1965 then to Lecturer in 1968 and Senior Lecturer in 1973. He retired in 1977. He had the skill and ability of making stereographic projections intelligible to undergraduates!]

Ian Stewart McCallum (BSc 1958)



It is with sadness that we report the death of alumnus Ian Stewart McCallum, formerly Professor of Petrology at Washington State University, Seattle, USA.

What follows is a personal eulogy contributed by **Arch Reid** (BSc 1955), a student colleague at St Andrews and a lifelong friend.

"I am now 83 years old and I have been a friend of Stewart McCallum for more than 60 years. We met first as undergraduates at University of St Andrews. What brought us into contact was that we both played football (soccer). At times we have played on the same teams, the college team at St Andrews, and later, the University of Western Ontario. I have to admit Stu was the better player. Stu was a couple of years behind me at St Andrews, but we were frequently together and had a lot of good times. I suspect that he may have blamed me for first getting him interested in geology; it was not a career much spoken about where he grew up in the Stirling area. It turned out that he was better than I was at geology. Looking back, if anyone in those days had predicted that we would both end up as university professors, our response would have been some combination of total disbelief and ridicule.

The geology department at St Andrews then was quite small and the petrologist, Harald Drever, could not have had all that many students. But from that source sprang people like Willie Mackenzie, Peter Wyllie and Colin Donaldson. Stewart McCallum belongs in that rather exalted category.

Stewart got a first in honours before he went out to Canada. He did a PhD at Chicago and a post-doc with Dan Weill in Oregon, before going to the University of Washington where he progressed to full professor. He was a leading petrologist who played a role in the lunar program but was best known for his work on layered intrusives, especially the Stillwater Complex.

Stewart stayed with us for a while in Canada and I was best man at his wedding to Doris. They also visited us in California, in Houston, and celebrated their 50th wedding anniversary with us in North Carolina.

Stewart had a long and truly influential career in geology. Besides being a gifted teacher, he completed many substantial ground-breaking research studies in his geologic fields of petrology and geochemistry. In science there are individuals who do good work and who play an important role, but who do not ever put their names to any major breakthroughs. Relatively few scientists achieve an outstanding reputation, though in some cases the reputation may be attained in part through their conscious advancing of their own achievements. Stewart McCallum does not belong in either of these categories. Never did anyone hear him pushing his own accomplishments or achievements, quite the opposite. His reputation was achieved through the outstanding quality of his research. Anything Stewart published was guaranteed to be totally reliable in content and to be a new and innovative contribution that forwarded our understanding of geologic processes. In his quiet way Stewart became an outstanding and much respected leader in petrologic research. He was also a teacher who directed and inspired a group of exceptional students. When I last visited him a few years back he had retired but was doing research and fieldwork on volcanics near the US/Canada border.

His work is not a bad legacy, but even more important is the legacy of his exceptional family. Stewart was a good friend to our family over a long lifetime. A modest man with exceptional understated ability, Stewart's outstanding accomplishments in his personal and family life, and in his career, came as a consequence of his character, his good nature, his hard work and his striking intelligence.

We will miss him."

Ian Maycock (BSc 1956)

Ian sent news of his recent Pioneer Award from the AAPG for his services to the oil industry. The citation for the award states: *For an exceptional career as a geoscience mentor role model and a pioneering international explorationist responsible for discovery of well over 3 billion BOE.*

An AAPG member for 35 years, Ian Maycock was responsible for Middle East discoveries of over 1 billion BO and 14 TCF gas. He has achieved every explorationist's dream, drilling the first wildcat well in a totally unexplored basin and discovering a giant oil field in Yemen in 1984.

Dougal Dixon (MSc 1973) has just published a revised edition of his book *After Man*. The Guardian review states: "The premise of the book is simple: take the Earth today, remove the humans, and let evolution take its course for 50 million years. What new animals evolve? Of course, in other hands this approach could have resulted in a throwaway romp. In Dixon's, it produced an incredibly detailed, thoughtful book, in which the principles of evolutionary theory and ecology are rigorously applied. Cypsis (adaptations to avoid being seen by either predators or prey) is a common theme, as is mimicry. And convergent evolution (the idea that unrelated organisms in similar ecological niches evolve similar adaptations) is everywhere. Each species has a scientific name which follows the conventions that taxonomists use, and the text describes their behaviours and inter-species interactions." The book is published by Breakdown Press.

OUTREACH

John Howard, a professor emeritus at Western University in London, Ontario, Canada, was walking with his wife on the shore just to the south of the Fairmont hotel outside St Andrews when he noticed an excellent tree fossil about 20" long. He left it there but then thought it is really a fine specimen and perhaps it would be a good specimen for study. So he contacted **Andrea Burke** who passed the note to **Stuart Allison** who then arranged a salvage operation.



Stigmaria root with rootlet impressions above



The salvage team in action. Lot Koopmans, Rory Changleng and Henrique Traeger

Rosalind Garton (BSc 1978, and Evening Degree Module Co-ordinator) recently led an excursion to the Fife coast for the Edinburgh Geological Society (EGS). The field trip was along the Ardross Fault near St. Monans, in an area well know to graduates of the SEES and popular with EGS Fellows. Here mid-Carboniferous sedimentary rocks were minding their own business when all hell broke loose and they were folded, faulted and shattered by Surtseyan volcanic activity, not necessarily all in that order!

EGS Fellows include both professional and non-professional geologists, so an excursion can generate controversy on the rocks. During the field trip discussions ranged over the relationship between the volcanism and faulting, the nature of the folding on each side of the fault, and the chemistry of bleached basalt - although it remains difficult to prise people away from the term "white trap"!

Rosalind continues to marvel over the geology of East Fife, and notes that, while coastal erosion is greeted with dismay by most people, to her it means revelation. In her 35 years of teaching field Geology to students in the university's Open Association she has seen the effects of many rock falls in Fife. In particular these have exposed a spectacular 2m high sand volcano, spotted by a sharp-eyed Open Association geology student who in his working life had been a power station engineer.



Rosalind and Edinburgh Geological Society Fellows scrutinise graded bedding in tuff on the Fife coast

GEOBUS

GeoBus rounded off a typically busy year (during which we reached and passed 70,000 pupils taught since the start of the project) with another successful field camp for senior pupils interested in studying Earth Science further. Making the most of the uncommonly good weather, we had fantastic trips to the Rock & Spindle, Ardross and St Monan's and finished by following in James Hutton's footsteps round Holyrood Park. Over the course of the week the pupils built on basic geological concepts and developed their rock and fossil identification, sketching and measuring skills, culminating in creating a geological map complete with cross-section. The week also involved a geo-careers talk by Peter Anning from Atkins UK and a geo-themed trip to the movies to see the new Jurassic World film, as well as multiple visits to Jannettas for ice cream!

Thanks to Edinburgh Geological Society for its support of the week and congratulations to all our wonderful student helpers who also graduated during the week.



The field camp gang on Davies Rock, St Monans

Finding continued funding for GeoBus is an ongoing challenge so our focus over the summer is to try to get something in place so that we can hopefully continue to reach pupils and spread the word about the fantastic opportunities studying Earth & Environmental Science can offer ... watch this space!



Sand volcano exposed at The Scores cliffs six years ago. (R.E.Garton)



