



University of
St Andrews | FOUNDED
1413 |

School of Earth & Environmental Sciences

Newsletter Number 19
Winter 2021



Welcome from Head of School

As my first Head of School message I would like to thank Tony Prave for his efforts as our outgoing Head of School. I cannot imagine a better captain as we navigated the treacherous waters of our first 4 years as an independent School. Tony's leadership always instilled an "all for one and one for all" camaraderie into the school — the "*esprit des corps*" as Tony more eloquently put it — and the sense that we were not simply workplace colleagues but more of a family, a view that spills over into our students and is frequently highlighted by them as one of the best aspects of the School. Tony has worked tirelessly to ensure that the School continued to grow and prosper but, as all Earth scientists are deeply aware, time moves on and change always happens. Tony can now take it a little bit easier and, when life returns to a more normal shape, do more of what he enjoys most and get out into the field.

It has been a trying academic year so far with the development of new online teaching strategies. I am incredibly impressed and proud of how both our staff and students have coped with all the changes to teaching delivery and the great uncertainty of this semester. As a practical-based School for which online teaching is more difficult than most, we have done better with this than many or most Schools within the University. Our Director of Teaching, Rob Wilson, has done a fantastic job with both his team of academics and also our team of dedicated students that make up the School president and year representatives to keep the channels of communication open. Thus, we have managed to have as many of our practical classes in person as possible and have still managed to get many of our students out in the field doing Earth Science in the natural environment. A number of the staff spent time over the summer collecting new samples for remotely-taught 1st year practical classes. Sets of samples were posted worldwide, as far as Australia, for those students who could not travel in person to St Andrews.

On the subject of change, the coming year will bring the School to some new accommodation and an opportunity for the School to stand truly independently not only in name but in place. The ever-increasing tectonic forces of the Irvine building squeeze has led to the need for the School to move to the Bute building, or should I say back to the Bute building. This has been made possible by the completion of the University's Eden campus at Guardbridge and the transference of the University's graduate centre to the old Burgh School. While the move has been delayed until spring, renovations of our new space are beginning and we as a School look forward to having a space that is truly ours.

I am also pleased to announce that we have achieved our stage 1 appeals target of £20,000 to purchase five new wifi-enabled teaching microscopes. Our deepest thanks go to all the incredibly generous alumni who have given to this appeal. Our ongoing appeal has taken a modern turn with Dr Catherine Rose taking over stage 2 with the launching of a Saintsfinder page (<https://saintsfunder.st-andrews.ac.uk/>). This page gives up to date accounting of our microscope drive and how they are being used, short videos and some nice thin section images, and provides a much simpler portal for donating to our microscope fund. I encourage you all to check it out to see how we are using these new microscopes.

I wish all our alumni a merry Christmas and a happy new year.

Richard (Dick) White

National Student Survey 2020

(Reported in mid-July).

The subjects with the greatest increase in rank position are:

Mathematics up 15 places (from 23 to 8)

Ecology and environmental biology up 14 places (from 15 to 1)

Earth Sciences up 13 places (22 to 9)

St Andrews is ranked top in the UK amongst mainstream multi-faculty HE institutions for overall satisfaction ("Overall, I am satisfied with the quality of the course"). St Andrews is the only institution with a higher than 90% overall satisfaction. Our overall satisfaction score is 2.77 percentage points higher than second placed Robert Gordon (89.96%).

League Tables

In September, the *Guardian University Guide 2021* listed St. Andrews 2nd in the UK after Oxford. Cambridge was relegated to 3rd place.

The *Guardian's* league table ranks universities according to: spending per student; the student/staff ratio; graduate career prospects; the grades applicants require to be offered a place; a value-added score that compares students' entry qualifications with their final degree results; and how satisfied final year students are with their courses, based on results from the annual National Student Survey (NSS).

STAFF NEWS

New arrival



Congratulations to **Claire Cousins** and **Sami Mikhail** on the arrival of baby Jacob at the end of June 2020. All doing well.



New arrival

Will Hutchison and his wife Tess had a baby girl in early August! Her name is Veronica Rose and she weighed in at a healthy 7 pounds (3.3kg). Tess is recovering well and we are slowly getting used to our new companion! We are absolutely chuffed to bits and can't wait for you all to meet her.



Adrian Finch received funding from the university's COVID teaching infrastructure funds to update our microscope imaging system. This involves new camera software and computer which, together with the new projectors from last year, may allow us to finally project an image of a mineral that actually looks like the right mineral. Importantly it will allow us to teach petrology remotely.

James Rae was awarded membership of the Royal Society of Edinburgh's Young Academy of Science in September. This recognises achievements by the younger generation of academics. He will be inducted "virtually" in January 2021. Congratulations.

New Staff

We welcome **Ross Whiteford** to the School as a new postdoc on our 100Myr of CO₂ project. Ross works on carbon cycle modelling on a range of temporal and spatial scales - from foraminifera to tectonic plates. He joins us from a postdoc position at Lamont, and before that a PhD at Southampton.



Ross

Nivea de Assis Magalhaes, who was featured in the last Newsletter (Summer 2020), has arrived in St. Andrews as Research Officer in charge of the Mat253 and associated laboratories. Welcome to SEES.

Tobias Mattsson joined the SEES team in September. Tobias will be joining SEES for two years as a Swedish Research Council International Postdoc from the Department of Geological Sciences, Stockholm University. Tobias studies strain localisation in granite plutons with a view to understanding how magma is remobilised immediately before volcanic eruptions occur. At weekends Tobias enjoys golf, field mapping, characterising magma flow indicators and long walks on sandy beaches, which means he will fit in well at St Andrews. Tobias will be working in the M³Ore lab in the Purdie Building.



Tobias

Nicky Horsburgh has been awarded funding from EPSRC through the Impact Acceleration Account, to further develop "Smart Sorting for the Sustainable Production of Critical e-Tech Elements." She and **Adrian Finch** will build a prototype using UV-PL, X-ray luminescence and TL to try and make REE ore processing more efficient for separating different commodities. They are partnered with some of the world's biggest REE miners on three continents.

Emeritus Professor John McManus recently married Wynne, who once was secretary to geology Professor Arthur Holmes in Edinburgh.

Stuart Allison at "30"

At the end of September, **Stuart Allison**, known to many of our readers, marked 30 years of employment in the Department/School. Former Head of School, **Tony Prave**, wrote this tribute to him.

It is a truism that cometh the time, cometh the man. Thirty years of dedication...think about that---how many of us have the wherewithal to be utterly and selflessly committed to making certain something is done right, often with not much thanks, and stay devoted to that for 30 years?!? Thus, I doff my cap, tap my heart and offer my embrace to Stuart for what he has given. Suffice it to say that, without Stuart, the life support needed for us to maintain a teaching and research programme through difficult times would have been switched off many years ago. It is no exaggeration to state that Stuart has touched the lives of every student that has passed through our collective doors and I have absolutely no doubt that he will be remembered most fondly 30 years hence. Alas, the times in which we now find ourselves restrict us from giving Stuart a proper human-to-human celebration for his three decades of giving. So, I ask all of you to give Stuart a hearty virtual hug and a toast in his honour and

know that we will do something properly once societal interactions resume. Until then, I am sure all of you will join me in offering up the deepest and most sincere: **THANK YOU Stuart, we couldnae do it without ya!**



Stuart, once upon a time!

School relocation

As mentioned in the previous Newsletter, the School of Earth & Environmental Sciences is scheduled to move to the Bute Building early next year (see inner back page). To this end, **Stuart Allison** has been busy arranging for many tons of specimens to be transported from Irvine to Bute. To help with this enormous task, assistance was on hand (shown below).



Richard Batchelor (your editor) learned recently that his joint paper with former academic Peter Bowden had reached a galactic 1100 citations! Is this a record? No, it looks like a piece of paper!

Batchelor, R.A. & Bowden, P. 1985. Petrogenetic interpretation of granitoid rock series using multicationic parameters. *Chemical Geology* **48**, 43-55.

Funding

§ Four of our staff successfully gained SARRF funding. These are University grants for restarting research. 50% of our applications were successful and the lucky ones were **Tim Kinnaird, Andrea Burke, Eva Stüeken** and **Nivea de Assis Magalhaes**. **Tim's** award was for a project entitled "Building capacity for low-level environmental radioactivity measurements".

Under SARIRF - for restarting inter-disciplinary research - **Richard Bates** was awarded a grant for "The Fife Sustainable Natural and Cultural Coastal Zone - a blueprint for the sustainability of communities & the protection of natural & cultural heritage". **Mike Byrne** was also funded, collaborating with the Environmental Sustainability Board, to build a "St Andrews Network for Climate, Energy, Environment and Sustainability (StA-CEES)". **Tim Raub** has also had success in collaboration with Rebecca Goss on "Creating an Engineering Identity at St Andrews",

§ Congratulations are due to **Claire Cousins** and **Eva Stüeken** who were awarded a 3.5 yr PhD studentship grant in November from the Science & Technology Facilities Council and UK Space Agency for a project "*Microbial carbon and nitrogen fixation on early Mars and sequestration of geochemical biosignatures*" which will bring another PhD student into the School.

§ **Eva Stüeken** and **Rob Wilson** had a successful proposal accepted through a University Entrepreneurial Education Funding Competition. Total amount: £5167, to buy 24 probes to measure CO₂, NO₂, O₃ and organics and particulates. These will be used in new field based modules ES2003 (2021/22) and ES3001 (2020/21). This new kit could create a temporary (possibly permanent?) ES3001 module for next semester – focusing on aspects of air quality around east Fife and maybe towards Dundee (including the Eden campus?).

§ **Rob Wilson** and **Coralie Mills** (Honorary Research Fellow SEES) had a successful proposal through the University Impact & KE fund accepted. Total amount: £7,725 to write a guide for "Applications of Dendrochronology" for British Archaeological Jobs and Resources guide for archaeologists and heritage professionals

Mineralogical Society Award

Dr **Anouk Borst** has been awarded the Max Hey Medal 2021 by the Mineralogical Society of Great Britain and Ireland. This medal is awarded "to recognise existing and on-going research of excellence, evidence of which is provided in the form of work published in highly-regarded, international scientific journals".

Anouk joins the list of winners of this medal who are a roll call of the best in the mineralogical, petrological and geochemical sciences communities across British and Irish Universities, including Simon Redfern, Andrew Kerr, Madeleine Humphreys and Nick Tosca. Anouk's award includes recognition for her work on peralkaline igneous rocks and rare earth ore deposits.



Anouk holding up a rare eudialyte-bearing nepheline syenite at the Poços de Caldas Complex, Brazil.

Preparing to teach first year geology during a pandemic

Over the summer, some of our rock people (**Paul Savage, Batzi Fischer, Catherine Rose, Richard White**, and hero **Stuart Allison** who did the brunt of the work) were busy preparing sample sets for the remote teaching that the pandemic has brought upon us. In order to provide equal learning opportunities for all first year students, whether in St Andrews or joining remotely from elsewhere in the world, we decided to prepare an individual sample set for every student. Not knowing numbers, we aimed for 100 sample sets.

For most things that we thought essential first year material, our collections didn't provide enough samples. So we spent several days of small trips to collect entirely new samples. Because *minerals* are harder to find in large size and abundance, we had to order them from a geology supplier.

For *igneous rocks*, we collected from the Shap granite (collected by Batzi and Catherine), Elie basalt (collected by Paul and Stuart,) a Crawfordjohn essexite (to be used as a gabbro, collected by Paul), feldspar-porphphy cobbles washed up on an Aberdeenshire beach (Paul, Stuart and Batzi, also bringing back the Old Red Sandstone conglomerate), and the nearby rhyolite from Balmullo. (organised by Stuart, through our alumna Rosalind Garton).

Metamorphic rocks were a Norwegian garnet amphibolite from the same shop we used for minerals. In addition, Richard collected a slate/phyllite (Dunkeld), a spotted hornfels (Buchan-locality in Scotstown, Banff), and a garnet mica schist (a couple of large blocks from his garden, given to him by a neighbour!).



Fig 1 – “Gabbro” (really an essexite, with nice large pyroxenes), collected from boulders at Crawfordjohn (photo by Paul Savage).



Fig 2 – Batzi with half of the mineral boxes (inset shows the contents: 7 minerals, hand lens, streak plate, tack, grain size card).

Then, as we got closer to the start of semester, and we felt very organised, the confusion over the A-level grades in the UK unfolded and meant that we had more students taking our first year module than ever: a total of 151 students signed up!!! So, we ordered more mineral samples, and Stuart worked long days and weekends to cut the largest chunks of our rock samples in half to adjust numbers.

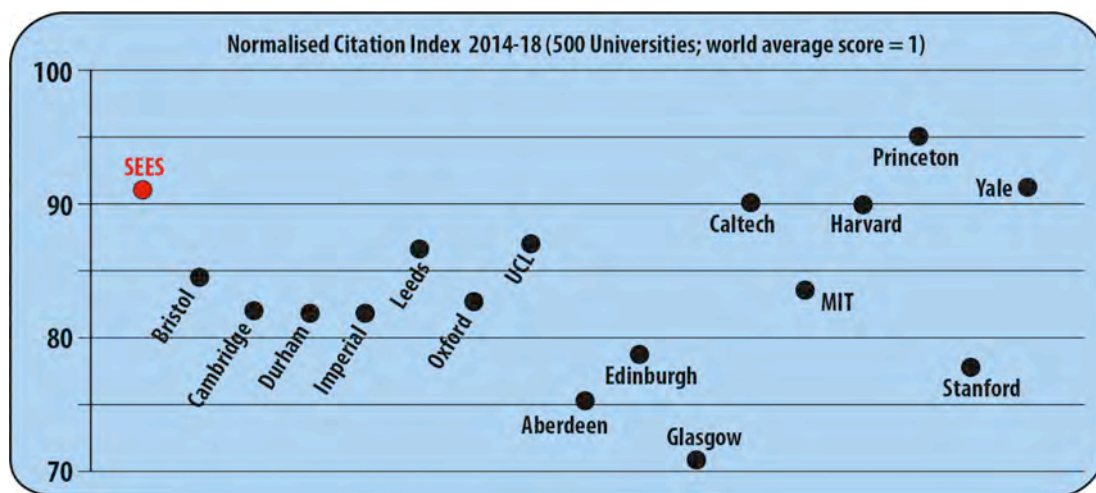
In the end, we managed to create enough samples, label all of them, and bag/box them up in time for every student to be loaned their own set (a box of minerals, and three bags of ign/sed/met rocks). The vast majority of students made it to St Andrews and managed to collect their set in week two, while Catherine and Lesley-Anne had already posted sets to the students that were still “trapped” in their home countries: Malaysia, Hong Kong and China, United Arab Emirates, USA, and Australia. This allowed us to teach first year

practicals entirely online, but still providing students with hands-on training in mineral and rock identification.

Nick Gardner has just been made the theme leader for the Geological Society of London's new Energy and Materials transition scientific theme. This post will include organising webinars, conferences and developing policy documents.

<https://www.geolsoc.org.uk/About/Press-Office/Press-Releases/Energy-Transition-Launch>

WHAT WE DO



2020 Shanghai Ranking Citations of Earth Science Departments

The 'Normalised Citation Index' is a metric that shows the amount of citations SEES St Andrews has achieved normalised to the average amount of citations for a given subject area; a value of 1 represents the world average thus anything above 1 is a value above the global average. This metric is a 'raw' power one that is probably as objective a measure as any that we could obtain that reveals the esteem in which our work is held worldwide.

Coral time machines reveal ancient CO₂ burps (James Rae)

The fossilised remains of ancient deep-sea corals may act as time machines, providing new insights into the effect the ocean has on rising CO₂ levels, according to research carried out by the Universities of St Andrews, Bristol and Nanjing.

Rising CO₂ levels helped end the last ice age, but the cause of this CO₂ rise has puzzled scientists for decades. Using geochemical fingerprinting of fossil corals, an international team of scientists has found new evidence, published in *Science Advances*, that this CO₂ rise was linked to extremely rapid changes in ocean circulation around Antarctica.

The team collected fossil remains of deep-sea corals that lived thousands of metres beneath the waves. By studying the radioactive decay of the tiny amounts of uranium found in these skeletons, they identified corals that grew at the end of the Ice Age around 15,000 years ago. Further geochemical fingerprinting of these specimens - including measurements of radiocarbon - allowed the team to reconstruct changes in ocean circulation and compare them to changes in global climate at an unprecedented time resolution.

Professor Laura Robinson of the University of Bristol, who led the research team, said: “The data show that deep ocean circulation can change surprisingly rapidly, and that this can rapidly release CO₂ to the atmosphere.” Dr **James Rae**, of the University of St Andrews, added: “The corals act as a time machine, allowing us to see changes in ocean circulation that happened thousands of years ago. They show that the ocean round Antarctica can suddenly switch its circulation to deliver burps of CO₂ to the atmosphere.”

“There is no doubt that Southern Ocean processes must have played a critical role in these rapid climate shifts, and the fossil corals provide the only possible way to examine Southern Ocean processes on these timescales”, said Dr Tao Li of Nanjing University, who is the lead author of the new study.

In another study published in *Nature Geoscience*, the same team ruled out recent speculation that the global increase in CO₂ at the end of the Ice Age may have been related to release of geological carbon from deep sea sediments. **Andrea Burke** said: “There have been some suggestions that reservoirs of carbon deep in marine mud might bubble up and add CO₂ to the ocean and the atmosphere, but we found no evidence of this in our coral samples”. “Our robust reconstructions of radiocarbon at intermediate depths yields powerful constraints on mixing between the deep and upper ocean, which is important for modelling changes in circulation and carbon cycle during the last ice age termination”, added Dr Tianyu Chen of Nanjing University, who is the lead author of the new study. **James Rae** added: “Although the rise in CO₂ at the end of the Ice Age was dramatic in geological terms, the recent rise in CO₂ due to human activity is much bigger and faster. What the climate system will do in response is pretty scary.”

Climate-related research in the School of Earth and Environmental Sciences

The nature of geological research has evolved rapidly in recent years to include the issue of environmental change, because as earth scientists we have been trained to take the long view on this topic. Dr **Tim Raub**, Director of Research in the SEES, has highlighted the great amount of climate-related work being carried out by members of the School, stretching from the Proterozoic to the current era. The work involves a substantial proportion of the School’s staff:

Tim Raub, Adrian Finch, Andrea Burke, Aubrey Zerkle, Catherine Rose, Claire Cousins, Ed Stephens, Eva Stüeken, James Rae, Mark Claire, Michael Byrne, Nicky Allison, Richard Bates, Rob Wilson, Tim Kinnaird, Tony Prave, Will Hutchison, and David McCarthy of the School of Geography and Sustainable Development.

The projects in this field indicate how much earth and environmental scientists have to offer. SEES research topics include subjects as varied as:

- * The sensitivity of hydro-electric power strategies in Scotland and Malawi to droughts associated with future climate change.
- * Growing corals in tanks exposed to different temperatures and carbon dioxide conditions, to understand ocean acidification and coral reef bleaching.
- * New methods of measuring volcanic aerosols captured by ice cores, to understand the Earth’s climate sensitivity to eruptions of different explosivity.

- * The study of Snowball Earths (low latitude ice sheets), which have been the most extreme response of the Earth's climate to glacial forcing, and also the most severe greenhouse warming in Earth History.
- * The prediction of how potential life on extrasolar planets and on Mars may interact with modern weather cycles and climate regimes on those planets.
- * The calculation of heat anomalies in the Scottish crust, produced by buried granites and the legacy of blast-chill winds descending from the British-Irish Ice Sheet 15,000 years ago, and the correction of estimates of Scotland's geothermal energy resource for these climate-change effects.
- * The identification of migration of the tropical wet belt from season to season and year to year due to global warming, and the forecasting of how the intertropical convergence zone, which controls monsoons and cyclones globally, will change in the future.
- * The description of how different species of tree record changes in summertime temperature or rainfall in Scotland, the Gulf of Alaska, throughout Europe and the Levant. This information has been collated into an "Old World Drought Index" which helps in the understanding of the influence of climate on historical events, including plagues, famines, and political union.
- * The description of the flood hazard in gravelly rivers, such as those at the Himalayan mountain front, by dating ancient bank and bar deposits.
- * Drone-piloting skills and procedures with colleagues in developing nations, such as Malawi, to inform humanitarian response to sudden natural catastrophes such as river floods and earthquakes.

POSTGRADUATE NEWS

Congratulations to **Sophie Nuber**, who passed her PhD viva in June, subject to corrections! **Sophie** writes: I was born in Luxembourg, and grew up tri-lingually in Luxembourg and Germany. I received my Bachelors Degree in Environmental Science and Environmental Hydrology from the University of Freiburg in Germany. However, I spent only half the time in Freiburg. To extend my field of knowledge into marine science, I received funding to spend a year in Sydney, Australia, to attend Masters courses in Marine and Coral Reef Science. As part of my project, I researched the adaptability of corals on climate change at One Tree Island in the Great Barrier Reef and set up a monitoring station. While in Australia, I also worked for the Manly Environment Centre in Sydney which is a branch of the Australian Government. I was responsible for researching the history of seagrass species *Posidonia australis* in Manly Cove to determine the rate of decline as part of an Australia wide assessment. My work was published in a governmental report and advisory letter to the Australian government asking *P. australis* to be included in the list of highly endangered species. I also helped out with mangrove surveys in Sydney harbour with the Sydney Institute of Marine Science.

To complete my Bachelors degree, I accepted a half-year research assistant position at the International Livestock Research Institute (ILRI) in Nairobi, Kenya, to determine the greenhouse gas release from animal droppings in savanna. After completing my BSc, I went to University College London to gain a MSc in Climate Change based at Woods Hole

Oceanographic Institute in the USA on changes in the flow speed dynamics of the Iceland-Scotland overflow across multiple interglacials. I went on to do a PhD at Cardiff University in collaboration with the University of St. Andrews. My PhD thesis explored the question of atmospheric CO₂ reconstructions across the Mid-Pleistocene transition using boron isotopes from planktonic foraminifera extracted from a newly-drilled core in the western Indian Ocean. We found significant changes in the circulation pattern of the glacial Indian Ocean.

I have now started a postdoc position at the National Taiwan University. Here, I will be looking at N isotopes as a potential proxy for coral bleaching. We will use coral culturing and reef field observations to determine the influence of single bleaching processes on nitrogen isotope fractionation.



Sophie celebrating

Post-graduate conference

Last year's conference went virtual! Three sessions were held on Wednesday 'SUMMER' seminar slots in August. Each session had 4-5 PhD students and each student presented a short 10-12 minute talk on their research followed by about 3 minutes of questioning.

New PhD's

SEES will be hosting seven new PhD students from this Autumn. In no particular order, here are their names and project titles.

Florian Brouillet: A new multi-parameter toolkit to unlock records of past volcanism.

Madeleine Murphy: The co-evolution of Earth's continental crust and hydrosphere – a Si isotope perspective.

Madison Shankle: Rapid CO₂ and climate change in the Southern Ocean. (She is a native of Nashville, Tennessee, USA).

Lot Koopmans: Giant dykes and deep time tectonics.

Emily Reid: Reconstructing summer temperatures from tree-rings in the Southern Yukon, Canada.

Boontharee Chomhom: Dissolution of tropical marine corals, carbon cycling and consequences for corals reefs.

Nora von Xylander: The role of lipids in coral biomineralisation and the effects of future climate change.

Nora writes: Before moving to St. Andrews I was living in the Seychelles working as a Coral Restoration Project Leader for two of the projects run by the Marine Conservation Society Seychelles (MCSS). I first started working with MCSS for my master thesis back in December 2018, where I compared the growth and health of coral fragments between our ex-situ and in-situ nurseries, as well as conducted some experiments comparing fragmentation and micro-fragmentation. I worked on this project for 6 months, in the hope to enhance the coral restoration efforts undertaken by MCSS. I then went on to accept the role of coral restoration project leader for 1 year before deciding to start my PhD.

I graduated from the International Masters in Marine Biological Resources (IMBRSea), which is a joint Master program organized by ten leading European universities in the field of marine sciences. Before this I completed my Bachelor's degree in Biochemistry and Genetics at King's College London. My background has allowed me to develop a particular interest in the biochemistry and genetics of coral and understanding the effects of climate change and pollution on the physiology of organisms, such as corals.

I saw first-hand the effects of climate change, where the reefs of Seychelles are under a lot of pressure and are struggling to recover. I was driven to pursue research to address this issue, in the hope that answering the knowledge gaps will help in trying to address the pressing issue of the drastic decline of coral reefs occurring worldwide.



Nora

The MSc in Geochemistry at St Andrews

About a decade ago, when the University decided to invest in the (then) Department of Earth and Environmental Sciences, one focus was the hiring of a number of early-career geochemistry specialists, as well as investing in new, cutting-edge laboratories. This decision has definitely paid off: today, I don't think it is boasting to say that our School is a globally recognised hub for the broad application of geochemistry to the geosciences.

Taking advantage of this critical mass of geochemists (of all flavours), the School decided to develop, and offer, a new one-year taught post-graduate course: the MSc in Geochemistry. Lectures began in September 2016 with 8 students. The course has gone from strength to strength and this year, 17 new students started on the course – the MSc is now an established aspect of our teaching provision, and the students are an important cohort in SEES.

I joined the School as a lecturer in 2016. By the time I arrived, much of the hard work of setting up the course – the paperwork, the market research, the design of new modules and the cajoling of staff to teach had already been completed – mostly by the redoubtable **Ruth Robinson** and **Andrea Burke**. My responsibility, initially, was to co-run the course with Ruth, with a view to taking over coordination in the future – little did I know that, with Ruth taking early retirement, I would be running it later that academic year – and I have been ever since!

The course has evolved gradually over the years, but was always designed to give its students a strong theoretical background in chemistry as applied to the geosciences, as well as the technical laboratory and statistics skills to allow them to make and interpret accurate and precise measurements – all critical to the success of geochemical research.

Beyond this, the course is also designed to allow the students to tailor their degree. Students can choose to study modules in Ore Genesis (taught by **Adrian Finch**, **Ed Stephens**, **Nick Gardiner**, **Eva Stüeken** and others), Water in the Environment (taught by **Nicola Allison** and Earth Sciences alumnus hydrologist Alastair Black), Biogeochemistry (taught by **Aubrey Zerkle** and **Mark Claire**), and Petrogenesis (taught by **Dick White**, **Sami Mikhail** and **Adrian Finch**). This year we are introducing a module called “Chemistry of the Solar System”, which will be co-taught by **Bob Steele**, **Sami Mikhail**, **Mark Claire**, **Nick Gardiner**, **Donald Herd** as well as yours truly. It seems like the whole School now lectures on the MSc Geochemistry course!

(Photo below shows the first cohort of MSc Geochemistry students in Glen Esk)





The cohorts of the MSc in Geochemistry, as well as the then-new MSc in Mineral Resources, graduating in 2018

The culmination of the degree is the research dissertation – and students always tell us that this is their favourite part of the course. Each student integrates into one of our many research groups within the School – or at an external institute or company – and the quality of the research is always outstanding. In the past we’ve seen such varied research projects as helium isotopes in mantle diamonds, microplastic pollution, to tracing the provenance of Ancient Greek pottery, with many of these projects ending up being published in research journals.

Of course, the success of any degree course is really defined by two things: what our students do after graduation, but perhaps more importantly, how much our students enjoy the course! For the former, I think we can be proud – many of our graduates have ended up going on to study for PhDs at esteemed institutes like Cambridge, Durham, Imperial, Southampton and the Open University, to name but a few. Graduates have also moved into industry – in the resource sector, the nuclear industry, as well as analytical laboratory positions and environmental roles. I think, anecdotally, the quality of our Geochemistry graduates is really giving the course a strong reputation – having started from scratch just five years ago, this is pretty good going!

Do our students enjoy the course, and working in SEES? Well, that is not really for me to say, but there is pretty strong evidence that they do, because every year, some of our graduates decide to stay in St Andrews. Laura Crick (2017), Toby Boocock (2018), Helen Innes (2018) Boontharee Chomhom (2019) and Maddie Murphy (2019) were inspired enough during their time as MSc students to spend 3-4 more years studying geochemistry with us. Also, Helen Robinson (2018), Cari Littler (2019) and Sam Crace (2019) all work, or

have worked, in the School's analytical labs since graduating. We must be doing something right!

It has been a weird and stressful year with the pandemic. The organisation of the Geochemistry course, with the requirement of online provision of teaching has required a lot of work, and the whole School has put in the extra effort to make sure our current students enjoy, and benefit from the course as much as they would normally. Despite the new challenges, our current cohort of MSc Geochemists have handled the "new normal" with aplomb and I'm hoping that by Easter we'll be able to return to a degree of normality. This is my final year of running the MSc, and I am handing it over in a relatively good state (I hope!) to the able hands of **Aubrey Zerkle** and **Eva Stüeken** next year. They'll do a stellar job! Here's to 5 more years of Geochemistry!

Paul Savage

Three discretionary prizes/distinctions for the MSc Mineral Resources degree may be awarded each year.

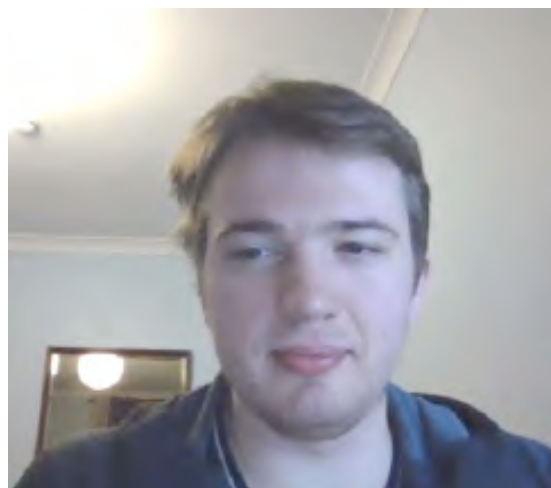
This year **Andrew Leslie** received two prizes for:

the best **field performance**. This prize is awarded to the student with the highest average for field work

the best averaged **academic performance**. This prize is awarded to the student with the highest average for modules undertaken during semester 1 and 2.



Andrew Leslie



Shane Webb

A prize is also awarded to the student with the highest mark in the ES5099 – Research project module. **Shane Webb** was the recipient this year.

UNDERGRADUATE NEWS

Rebecca Bateman, recipient of a Carnegie Trust scholarship, successfully spent the month of August working in the Luminescence Lab with **Tim Kinnaird** (in spite of Covid-19 restrictions).

SEES Evening Degree Module & Covid, 2020

A SEES Evening Degree module (ES2901) was able to continue during lockdown in the Candlemas Semester of 2020. Module Co-ordinator **Rosalind Garton** (BSc 1978) took on the challenge of teaching on-line a class of part-time students, with very little field experience, how to make a geological map and cross section. This was done without the field trip which we would all expect to undertake in order to gather mapping data. Remember those dip and strike exercises!

With the help of SEES Newsletter Editor **Richard Batchelor**, Rosalind put together a virtual field trip. She gave the students the data and, in a lecture on Teams, showed them how to add the data to the map and how to take a cross section. These students had, up to this point, done one field trip only, so the work was a real challenge in both field techniques and in 3-dimensional perception, because they mapped the fold closure of the plunging St. Monans Syncline.

The students, who included a former soldier, a fire fighter and a retired surgeon, produced really good work. Rosalind says that if you'd asked her a year ago if students with such limited field knowledge could be taught virtually such a very "hands on" sort of subject, she would have said that it was impossible. So, Covid has been tough for those who teach, but it has also given opportunities for a different kind of educational creativity, and the Evening Degree students were delighted that they could continue their studies.



*Richard Batchelor and the fold closure at St. Monans.
The top marks went to the students who realised that the fold was plunging!*

ALUMNI NEWS

Edward Pegler (BSc 1988) wrote in late-July:

" I just wanted to say what a delight it is to receive your newsletter. I've managed to cancel everything I normally get from my old school, St Andrews, Edinburgh and even Cambridge (which I was at for about half an hour) but I wouldn't want to ever cancel this. Yes, so I only recognise one person in all the pictures but the whole thing just seems so human."

Ed worked for De Beers in South Africa until 1995 then became a teacher of Physics and Electronics in Swindon. Now he lives in the Scottish Borders, doing up an old house in Yetholm, living on top of Carboniferous lavas and within sight of The Cheviot. He gazes at the layering in the hills thinking something surely could be made of all that. The geomorphology seems more rewarding as there's something funny going on with the rivers there, he says. He was pleased to see a glacial deposit featured on the cover of the previous issue of the Newsletter, Winter 2020.

Callum Reekie (MGeol 2016) performed notably well with us and he was a driving force in the first student expedition to Greenland. After St Andrews, he embarked on a PhD project at Cambridge on Fe isotopes. Following a successful PhD thesis defence on "Teams", Callum is now Dr Reekie. Congratulations.



Callum

Jim Westland (BSc 1980) has been busy on Mull presenting its geological wonders to the public online on behalf of the Scottish Geology Trust. He has produced:

Mull – A Geological Journey, The Staffa Lava Formation, Loch Bà Ring Dyke virtual field trip, Dykes Sills and Cone Sheets for beginners, Mull Lavas

He is about to produce virtual field trips for: Iona, Ross of Mull, SE Mull. He did a piece on the geology of Carsaig Bay for the BBC "Landward" series which was transmitted recently. He is also working (in conjunction with a GIS expert) on a multimedia web-map based excursion guide to Ulva's geology (an island off Mull which recently succeeded in a community buy-out).

See his web site at: www.mullgeology.net

Rosalind Garton (BSc 1978) runs an adult education business, *St. Andrews Open Learning*, and since 1984 has taught popular Enjoying Geology classes in Perth, St. Andrews and Kirkcaldy. Like many teachers, she found that the arrival of Covid-19 restrictions demanded a new kind of academic creativity in order to keep courses going. As soon as restrictions were eased in August, she began to plan for the resumption of classes in the field, which included looking for new teaching sections so that students who normally attended courses of lectures could come on easy access field trips.

Archibald Geikie commented in 1902 that the coast of East Fife was the best place in the British Isles for teaching Geology through field studies, and Rosalind knows how fortunate she is to have such a fantastic outdoor class room at her disposal. The current conditions have emphasised this. With over 200km of mostly rocky coast, the Fife shores provide unrivalled opportunities to learn about Geology from the rocks at your feet. When classes resumed in early September they were mobbed, and a second course was set up, which was mobbed too! One result of the Covid restrictions has been the reduction in class sizes, so that teaching can be carried out with social distancing. Rosalind says that she could get hooked on these small groups, with more opportunity during classes to discuss the rocks. This kind of teaching involves geological theory regularly being challenged by the students. The high calibre of students at these classes includes doctors, engineers of all fields, chemists, school teachers, academics, accountants, sociologists, lawyers, physicists, fire fighters, biochemists, and members of the armed forces. They take nothing for granted in their learning and keep Rosalind on her toes!



Rosalind (2nd from right) and her group near Kingsbarns looking at limestones and septarian nodules.

OUTREACH

GeoBus

It has been a busy time for GeoBus, our role dramatically changed as COVID changed the landscape of our outreach activities from face-to-face school visits and large events to on-line delivery and small group teaching. We have been participating in online widening access programmes, such as the Sutton Trust Summer School and First Chances Fife programme. Many science festivals this year have been held as digital events e.g. Dundee Science Festival, TechFest, Explorathon and Our World, Our Impact. GeoBus has contributed content on a variety of subjects including; climate change, Mars, microbiology and volcanoes.

The Scottish Geology Trust ran the Scottish Festival of Geology 2020, from mid-September to the end of October. This was a mix of online talks, virtual field trips and in-person events. **Richard Bates**, **Matthew Warke** and **Tony Prave** provided entertaining talks for the festival.

We also managed to run socially-distanced field trips for the festival, with **Catherine Rose** leading a fossil hunt at Pittenweem and **Adrian Finch** leading a trip to Elie to look at ancient volcanoes and Elie 'Rubies' (garnets). The children won on both trips - finding the most and also the best fossils and garnets!



Pittenweem



Elie

ADDENDA

Geo-Humourati

As an antidote to the strictures of Covid-19 last year, some staff started a *humourati* School e-mail list, circulating amusing cartoons, sayings, etc. in order to lift the corporate spirits (I'll drink to that - **Editor**).

Some cartoons were lifted from the internet and so are not be reproduced here. However, your **Editor** unearthed his Geo Humour files, dating back to the 1980's, from which he has gleaned a few select items for your amusement or groans, depending on your disposition.

Howlers: Students have an uncanny knack of misunderstanding facts or sometimes wilfully misinterpreting them. Here are a few gleaned from years past.

- * The dating of rocks depends very much on the superstition principle.
- * There are three types of rocks - ingenious, sedentary and metaphoric.
- * Glaziers are common; they move about a foot per day in Switzerland.
- * The Pyramids are a range of mountains between France and Spain.
- * Permeable refers to the rock's ability to pass water.
- * Coal is decayed vegetarians.
- * Muscle bands occur in the Carboniferous.
- * Kaolin is the product of a granite in the explosive phase, carried by wind as igneous dust and deposited as loess, especially in China, hence it is called China Clay

"OK, that's enough" (**Editor**).

Specialisations

A PETROLOGIST is someone who knows very little about a great deal and keeps knowing less and less about more and more until s/he knows nothing about everything.

A GEOCHEMIST knows a very great deal about very little and goes on knowing more and more about less and less until s/he knows everything about nothing.

A GEOLOGIST starts out knowing everything about everything but gradually knows less and less about less and less until eventually s/he knows nothing about nothing due to the advice received from Petrologists and Geochemists.

Anon. 1989

FROM THE ARCHIVES

* **Catriona Breasley** (final year M.Geol student) sent your editor a photograph she obtained from her mother **Liz MacNaughton** (BSc 1975). This football scene (1974/75) is quite evocative and one member of the team is still with us in St. Andrews! If anyone can fill in the gaps in the name list, please let the editor (rab) know.



L to R: ?, Richard Patrick, ?, ?, Andy Barman, ?, Dave Pirie, Ed Stephens, ?, ?, Derek Reay

* Hi-tech equipment in the former Geology Department!



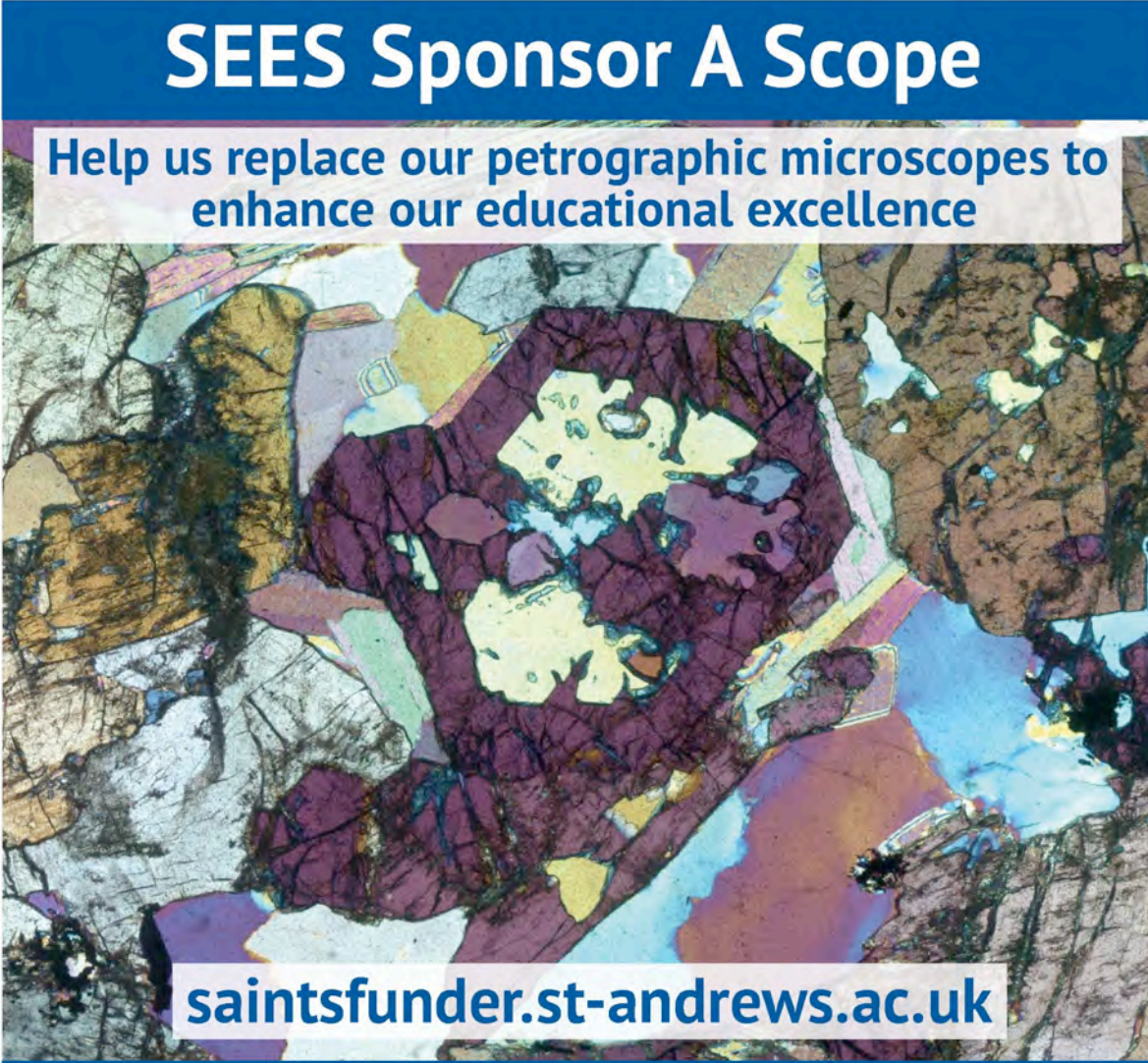
State of the art X-Ray equipment, 1960's. The late Dr Tony Weir is inserting a pressed powder pellet for XRF analysis. XRD machine is on the left. One generator served both machines.

* As an executor for the late Dr Tony Weir, I (your editor **Richard Batchelor**) acquired a collection of Tony's 8mm cine films. These were bequeathed to the National Film Library in Glasgow. They kept the transport-themed films but rejected four relating to geology field trips. These have been returned to me and I intend to get them copied to DVD. The reels

are labelled: St Andrews excursion 1967; Southern Uplands & Ullapool 1972; Haltwhistle 1971; Ullapool 1968.

If any readers think they may have been on these excursion, please let me know and I'll look out for you!!

FUNDRAISING



SEES Sponsor A Scope

Help us replace our petrographic microscopes to enhance our educational excellence

saintsfunder.st-andrews.ac.uk

DONATE TODAY

As Professor White mentioned in his Welcome address, the School needs to replace its collection of ageing microscopes. This is the link for targeted donations.

<https://saintsfunder.st-andrews.ac.uk/>



Bute Building from the air (Google Earth), home to SEES next year.

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>
In the loop news: portal@st-andrews.ac.uk

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 (until Spring 2021)

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).

Front cover picture: View of Anstruther, Fife, with Carboniferous sediments in the foreground (RAB)

Back cover picture: Sand volcano (~1.5m high) exposed after a rock fall in the cliffs beneath The Scores, St. Andrews, in 2010 (R.E.Garton)

The University of St Andrews is a charity registered in Scotland, No: SC013532

