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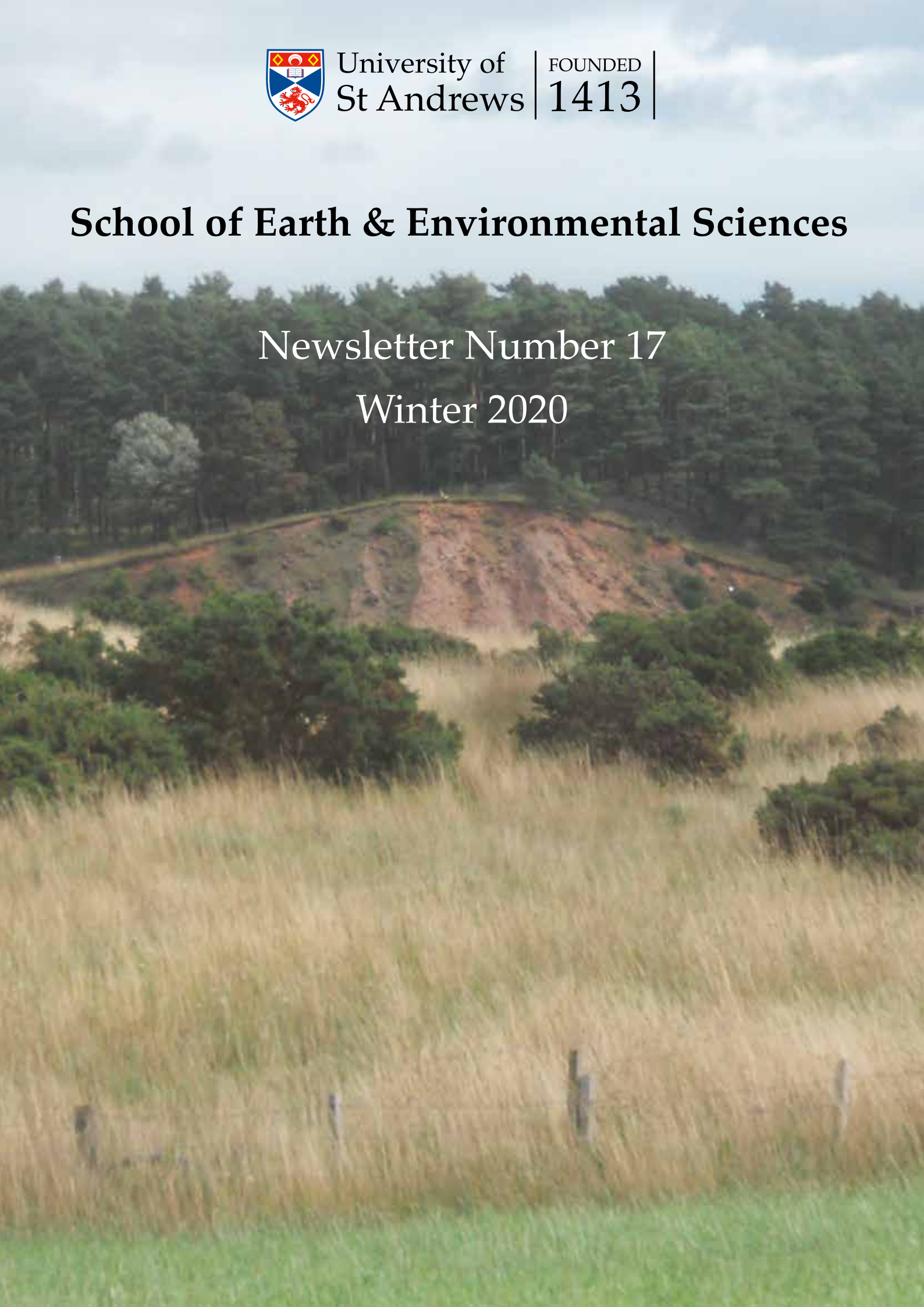
School of Earth & Environmental Sciences



Newsletter Number 17

Winter 2020

Welcome from the Head of School

Hopefully your entry into 2020 was enjoyable.

As we enter the 3rd decade of the 21st Century, Brexit has happened and where that will lead remains uncertain but one thing for certain is that the School continues to hold its own, and then some, on both the national and international stage. The past decade has seen, to paraphrase one of the biggest movie franchises of all time, The Rise of Earth Sciences (for those of you not into Star Wars, the final film of that remarkable 40-year-long franchise that premiered in December is entitled The Rise of Skywalker): from our very humble beginning at the start of the past decade, the past 10 years has seen creation of an independent stand-alone academic entity with a critical mass of expertise that spans from planetary habitability to solid Earth geodynamics to the dynamics of ocean-atmosphere coupling to climate change. Given that foundation, our next decade will assuredly be marked by exciting and fun science!

We must tip-our-collective-hats and give a hearty "thank you" to Verus Petroleum and Russell Reekie (2003) who have single-handedly enabled GeoBus and related outreach activities to continue well into this decade. As many of you know, GeoBus is our outstanding educational outreach programme that has, since its inception in 2011, reached more than 67,000 students in more than 275 schools across the entirety of Scotland. Through Russell's efforts, Verus has provided £0.5M for GeoBus and for retaining Dr Jen Brooke as our Impact and Outreach Officer in charge of GeoBus.

A second tipping of our collective hats and rounds of hearty "thank you" is to Pat Foster, Neil Alford and The Grocers Hall charity. Our ageing petrographic microscopes long ago reached the end of their sell-by dates; Stuart Allison's heroic efforts have kept them functional but 'functional' is no longer good enough. Pat, Neil and colleagues have initiated a crowd-source style effort to help raise funds, in conjunction with financial support from the University, to replace all 50 scopes. We will need to stage this over several years because one scope costs a cool £5k, hence we are looking at a total bill approaching a quarter of a million Pounds! Pat and Neil (Neil's single generous donation of £5K has now put our total down to 49!) have kick-started the campaign and we welcome all donations towards this effort which could be given via The Grocers Hall or directly to St Andrews' Development Office via Ms Lynsey Kerr (Lynsey Kerr lk20@st-andrews.ac.uk). Simply state that your donation is for the School of Earth and Environmental Sciences' microscope fund.

The political and social landscape may be undergoing tectonic shifts but, as detailed in this Newsletter, the School is charting a steady course based on our principles committed to doing curiosity driven and applied Earth science to standards that are second-to-none. Bring on the 2020's!

Best wishes to all,

STAFF NEWS

Congratulations to ***Sami Mikhail*** who was chosen (in late-July 2019) by the Council of the Mineralogical Society of Great Britain & Ireland as one of their two Distinguished Lecturers for 2019-20. Excellent kudos!

Tim Kinnaird and his colleagues who run the luminescence lab landed a £950k grant from the Arts and Humanities Research Council in August last year for a project entitled ***TerraSAgE: Terraces as sustainable agricultural environments***

Michael

Congratulations to ***Michael Byrne*** who has been awarded a Carnegie Trust grant to host an international conference on Continental Climate Change, June 15-17, 2020. Clouds are one thing that we are all well aware of living in Scotland. One of the big uncertainties in climate models is the sensitivity to climate of cloud cover. In addition to the Carnegie grant, ***Michael Byrne*** and colleagues have been awarded a NERC grant to understand the feedback processes between clouds and climate, which is one of NERC's priority strategy areas.

Nick Gardiner (who arrived in September), ***Richard Bates*** and ***Will McCarthy*** have been successful in obtaining ***Global Challenges Research Fund*** funding for their work in Rwanda, Tanzania and Kazakhstan, respectively.

These awards highlight yet again the global reach and impact of SEES research.

Our Finance Administrator ***Marie McRae*** left us in late October to take on an administrative post at Glasgow University. We wish her and her family good wishes for their future. We are very pleased to announce that ***Janet Delalonde*** has been offered and accepted the offer to stay with us as School Administrator, and ***Katie Smith*** from FAS will be joining us as our Finance Officer (replacing Marie) at the start of the New Year.

Visiting Researchers

Suren Tovmasyan

Both are working with ***Tim Raub, Richard Bates, Abigail Robinson*** and ***Sarah Boyd*** during their stay. ***Suren*** and ***Anush*** both are geodesists studying aspects of earthquake hazards and landscape/lake evolution in Armenia. ***Anush*** is a PhD student and ***Suren*** is Head of Department for Engineering and Geodesy, both at the National University of Architecture and Construction in Yerevan. ***Suren*** has extensive UAV and surveying experience and is involved with hydraulic engineering and Armenian state water management boards and issues.

Anush Margaryan

In early October, former EES secretary Cathy Brown visited Scotland with her Danish friend Ann, and they met up with roving reporter Richard Batchelor. Cathy now works in administration for the University of Bristol.

Cathy and Ann

Congratulations to ***Matthew Warke*** who won a grant from the Carnegie Trust to continue his work assessing Earth's early atmospheric and climatic convulsions following on from the Great Oxidation Event. The title of his proposal is: Did 'Snowball Earth' glaciations trigger the Great Oxidation Event?

Matthew Warke

UNIVERSITY OF BONN LINKS

There is a Memorandum of Understanding between St. Andrews and the University of Bonn and some sort of still closer formal tie is likely to be agreed.

There probably will be money available for: joint, 3-4 day, women-in-science workshops (something Bonn already subsidises), especially for ECR; 4-6 month sabbaticals hosted at Bonn; family exchange fellowships - preferentially by gender - bring a Bonn prof here, along with her family; or travel with your family to Bonn for some extended interval of time. Bonn probably has ways to host visiting professorships by any St Andrews academic for short intervals of time (summer, winter, 2-week intervals). Both Universities would want to see explicit planning for subsidised events / visits to lead to external funding applications. Bonn and St Andrews will strongly prioritise seedcorn funding, PhD funding, workshops, etc. co-developed between St Andrews and Bonn academics.

SEES staff were in Greenland in October 2019 and their activities were reported in the Scottish press.
https://www.heraldscotland.com/news/17906389.scots-scientists-unearth-secrets-earths-crust-greenland/

Sam Crace has just finished his MSc Geochemistry course here and will be staying in St Andrews for another four months.

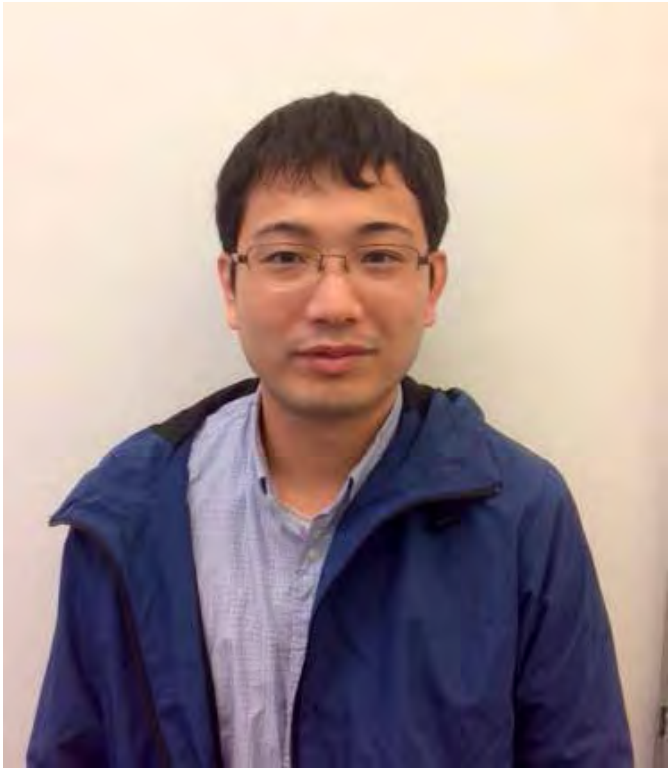
Sam

He is going to be helping ***Tommaso Di Rocco*** (and Eva, Sebastian, Catherine, etc.) with a project that should benefit the entire school - revitalizing the Delta XP and its peripherals (gas bench and TC/EA). For many years, this instrument was a workhorse for school projects (including many dissertation projects). When complete, we should be able to analyse with relative ease: $\delta^{13}C$/ $\delta^{18}O$ in carbonates, as well as $\delta^{18}O$/ $\delta^{34}S$ in sulphates, $\delta^{18}O$/ $\delta^{15}N$ in nitrates, and $\delta^{18}O$ in silicates. He will also be helping on some sample preparation. He will be mostly based down in our labs in the Purdie Building.

Our funding success continues with ***Tim Raub*** being awarded ***Global Challenges Research Fund*** support for his collaborative project *De-risking water resource and energy asset development in Malawi.* (August 2019).

Tommaso Di Rocco left us at the end of October for a position in Gottingen, Germany. He has been an outstanding colleague and Research Officer. The Master has agreed to a replacement, but we will have to wait for final approval from Workforce Planning before advertising.

Yoshi Endo is post-doc with Tokyo Tech, but he is spending the first 6 months of it here as a visiting scholar, before heading back to Japan



Yoshi

to finish the project. Yoshi recently finished his PhD, where he made a number of fundamental experimental measurements of subtle isotopic behaviour during SO_2 absorption. He was also part of the team that developed the CPP method for multiple sulphur analysis, of which we have become the second lab in world to implement. He is here to learn numerical modelling, with the goal of incorporating his newly measured fractionation factors into photochemical models of atmospheric chemistry. He will take those skills back to Japan, where he will continue his postdoc in experimental photochemistry, further teasing apart the quantum mysteries of the way SO_2 absorbs light.

Sonny

Sonny Harman joined us in September for 3 months before starting a permanent job at NASA Ames Research Centre in the new year. Recently he worked at the NASA Goddard Institute for Space Science, based at Columbia University in New York City. There he was working on the ROCKE-3D project, a key component of the interdisciplinary NASA NeXSS by expanding the well-established GISS community 3D-GCM for exoplanet work. Here he returned to some of the work he did for his PhD, working on 1D photochemical modelling of sulphur isotopes, with applications towards understanding (and better constraining models of) Earth. He left SEES in December 2019.

Helen Innes has accepted a DTP studentship through the IAPETUS2 NERC DTP and will be matriculating at the end of October! She is researching volcanic eruptions during the past ~100,000 years, by analysing tephra deposits and performing isotopic analysis on volcanic sulphur, both preserved in polar ice core records. This analysis will help evaluate source location, plume height, and spatial extent of emitted sulphate aerosols, therefore aiding understanding of the climatic impact of large eruptions.

Mark Fox-Powell left SEES in November to take up a position at the Open University Planetary Science Group.

Your editor, ***Richard Batchelor***, had his Honorary Research Fellowship renewed for another 3 years.

James Barnett joined SEES in early November as post-doc. He is working with James Rae at developing a 100-million-year record of atmospheric CO_2 spanning the Late Cretaceous to the present, using boron isotopes in foraminifera.

James Barnett

James finished his PhD at the University of Exeter (Cornwall Campus) in 2018, where he investigated the principal forcing mechanisms driving the climate and carbon cycle during the greenhouse world of the Late Cretaceous to Early Eocene (~67-52 Ma), using stable carbon and oxygen isotope and trace metal proxies in foraminifera.

Claire Cousins and ***Aubrey Zerkle*** successfully landed a Leverhulme grant worth ca. £194k to investigate *"Searching for Life on Europa"*. The grant will also support a PDRA so we'll have another member of the SEES family to welcome in due course.

Rowan McLachlan is visiting SEES for the month of January. Rowan graduated from the School of Biology at St. Andrews and she is now studying for a PhD at Ohio State University. Rowan is researching the impacts of temperature and ocean acidification on tropical corals and has brought some samples here for analysis.

Rowan

Calanais Virtual Reconstruction Project

Calanais standing stones, Isle of Lewis
https://news.st-andrews.ac.uk/archive/ancient-secret-of-stone-circles-revealed/

New evidence of a massive lightning strike at the centre of a hidden stone circle in the Outer Hebrides may help shed light on why these monuments were created thousands of years ago. The Calanais Virtual Reconstruction

Project, a joint venture led by the University of St Andrews with the Urras nan Tursachan and the University of Bradford, with funding from Highlands and Islands Enterprise, has uncovered a potential link between ancient stone circles and the forces of nature. While studying prehistoric Tursachan Calanais, the main stone circle at Calanais on the Isle of Lewis, the project team surveyed nearby satellite sites to reveal evidence for lost circles buried beneath the peat.

One rarely-visited site surveyed, known as Site XI or Airigh na Beinne Bige, now consists of a single standing stone on an exposed hillside overlooking the great circle. Geophysics revealed that not only was the stone originally part of a circle of standing stones, but also that there was a massive, star-shaped magnetic anomaly in the centre – either the result of a single, large lighting strike or many smaller strikes on the same spot. Project leader ***Dr Richard Bates***, of the School of Earth and Environmental Sciences at the University of St Andrews, said: "Such clear evidence for lightning strikes is extremely rare in the UK and the association with this stone circle is unlikely to be coincidental. Whether the lightning at Site XI focused on a tree or rock which is no longer there, or the monument itself attracted strikes, is uncertain."

WHAT WE DO

This is a new initiative to highlight cutting edge research by members of SEES.

* In a recent paper in Mineralogical Magazine, ***Anouk Borst, Adrian Finch, Nicky Horsburgh,*** former SEES PhD student Henrik Friis and colleagues determine for the first time the crystallographic position of neodymium and yttrium in the stunning crimson-coloured, rare-earth ore mineral, eudialyte. Eudialyte is one of the few minerals that concentrate heavy rare earth elements at similar levels to light rare earths, and it also produces relatively little radioactive uranium and thorium waste during its beneficiation. As a result, its mining is critical for entire sectors of the modern industrial economy, particularly green technology utilising high energy-density magnets and touchscreens.

Borst, A.M., Finch, A.A., Friis, H., Horsburgh, N.J., Gamaletsos, P.N., Goettliche, J., Steininger, R., and Geraki, K., 2019. Structural state of rare earth elements in eudialyte-group minerals. Mineralogical Magazine, pp. 1-16,https://doi.org/10.1180/mgm.2019.50.

* In a new paper in Journal of Volcanology and Geothermal Research, ***Rob Wilson***, former SEES PhD student ***Milos Rydval*** and a collaborating team of both historians and scientists demonstrate, using tree-ring reconstructions, that the late 1690's were the coldest decade in Scotland over the past 500 years. They articulate multiple lines of evidence that this climate cooling crisis was caused mainly by atmospheric dust and aerosol effects from 3-4 volcanic eruptions: one at Laki, Iceland and 2-3 in the tropics, forcing mean summer temperature in the Cairngorm Mountains >1.5 degrees Celsius colder than the recent, 1961-1990 average. July 1696 saw three weeks of near-nightly ground frosts in Edinburgh, Bo'ness, and Kinneil, and ~100,000 Scots perished from famine and pestilence over the decade (10-15% of the population). The primary sources of historical documentation of the awful climate of the 1690's are remarkable to read.

D'Arrigo, R., Klinger, P. Newfield, T., Rydval, M., and Wilson, R.J.S., 2019. Complexity in crisis: The volcanic cold pulse of the 1690s and the consequences of Scotland's failure to cope. Journal of Volcanology and Geothermal Research, v. 389, art. 106746 *https://www.sciencedirect.com/science/article/pii/S0377027319303087.*

* In a recent paper in Life, and the first of his PhD career at St Andrews, ***Jianxun Shen***, along with ***Aubrey Zerkle***, ***Eva Stüeken***, and ***Mark Claire*** suggests that nitrate salt-rich environments on modern Mars can provide the nitrogen needed to sustain microbial life and should be targeted in future life-detection missions. Jianxun and colleagues characterised physical, chemical, and biological properties of 7 regolith sites in a latitudinal gradient across Chile's Atacama Desert, a Mars analogue due to its aridity, high UV flux, high nitrate concentration, and overall biological infertility. Using microbiological techniques, Jianxun measured organic content

and grew microorganisms capable of forming colonies from dug-out Atacama sediment. Growth profiles varied across the different sites, which Jianxun characterised, via hierarchical clustering as hyperarid, arid, or intermediate. Jianxun and colleagues discovered that Atacama microbes grew best when extracted from high nitrate-to-biomass ratio sites in each cluster. Since there is no detectable rain on modern Mars, nitrate and biomass concentrations there should be tightly correlated to regolith grain size and mineral composition. This offers a specific life-targeting template for future Mars missions.

Shen, J., Zerkle, A.Z., Stüeken, E.E., and Claire, M.W., 2019. Nitrates as a Potential N Supply for Microbial Ecosystems in a Hyperarid Mars Analog System. Life, v. 9, art. 79, *https://www.mdpi.com/2075-1729/9/4/79.*

* In a new paper in Geobiology, ***Eva Stüeken*** and colleagues demonstrate that several living cycad plants faithfully preserve the Nitrogen isotopic composition of Earth's modern atmosphere, +/- about 2 per mil. (Cycads are long-lived, tropical and subtropical, pinnate-leaved gymnosperms that look like giant ferns but are not - Eva's team studied 100 leaves on 5 species in 3 Australian locations.) Because cycads are "living fossils", with an abundant fossil record in the Mesozoic Era and early examples at least as old as the late Permian, Eva's study justifies measuring isotopes of fossil plant impressions to try to establish an atmospheric nitrogen isotope record through the past 250 million years. Doing so could test whether Earth's atmosphere has been in equilibrium or else gradually losing nitrogen, the two current and opposing hypotheses.

Kipp, M.A., Stüeken, E.E., Gehringer, M.M., Sterelny, K., Scott, J.K., Forster, P.I., Strömberg, C.A.E., and Buick, R., 2019. Exploring cycad foliage as an archive of the isotopic composition of atmospheric nitrogen. Geobiology, :1-15 *https://onlinelibrary.wiley.com/doi/full/10.1111/gbi.12374.*

POSTGRADUATE NEWS

Heartiest congratulations to ***Chibuzo Chukwu*** who passed his PhD candidacy exam in July! Chibuzo will be spending the next 3 years with us designing innovative tools for imaging geothermal resources and testing them in Malawi.

Zuze Dulanya and ***Blackwell Manda*** (PhD 2016) visited SEES in August. Blackwell and Zuze are each currently researching a variety of geothermal energy, seismotectonics, magmatic petrogenesis, hydrology, and geomorphology questions in Malawi and eastern Africa.

Zuze Dulanya (left) and Blackwell Manda (right)

UNDERGRADUATE NEWS

Julian Fowler and ***Dylan Bogoevski*** were recognised by OzMinerals. Julian and Dylan submitted their MinRes and MGeol coursework, self-learning, and ES5009 project into a submission to the crowd-sourced Big Data-based "Explorer Challenge" last spring, proposing new exploration targets around the Prominent Hill iron oxide, copper and gold deposits in the Australian Outback. Their

submission was entitled: *"ASTER VNIR/SWIR Iron Speciation and Geophysics Predict IOCG Mineralisation within the Gawler Craton"*

Cari Littler, one of our top MSc geochemists, is staying around after completion of her course. Cari will be in St Andrews until spring 2020, when she plans to embark on some epic travels before starting a PhD program next autumn. She will be working to help process and analyse sulphate samples for multiple sulphur and oxygen isotope compositions. The samples include those collected in our recent excursion to Australia, as well as some Atacama sulphate samples.

ALUMNUS NEWS

Lt Col ***Drew Craig*** (BSc 1997) has been appointed as the Chief Geologist to the British Army. This is an Army Reserve post within the Royal Engineers and comes after 26 years' service that has seen travel to Bolivia, Brazil, the Falklands, USA, Uganda, Cyprus, Ghana and Italy, and an operational deployment to Kuwait and Iraq. Drew heads up the specialist Military Geology Cell and has previous served in a range of other roles including EOD & Search, CIMIC (Civil Military Cooperation) and geographic support. Outside of the military, after finishing in St Andrews Drew completed a MSc in Mineral Exploration at the Royal School of Mines (Imperial Collage) and continues to work as a consultant in the mining sector with Rocklore Exploration Services Limited. He has recently been involved on projects ranging from independent technical reporting, to mining finance innovation, and providing factual witness expertise on a major international arbitration. Drew now lives near Guildford with his wife Emma and two children, Robert and Elizabeth.

David Robertson (BSc 1988) writes:

"I graduated in Geology in 1988 and then returned to the Royal Navy – I had completed my degree on a cadetship scheme having joined the Royal Navy in 1983. On my return, I didn't use much of my degree initially as I still had to pass lots of Naval exams and gain skills and experience navigating ships. However, following the Gulf War of 1991, where I served in a small range of ships engaged in countering the mine threat to shipping, I joined the Hydrographic Survey Squadron of the Royal Navy. This is a somewhat little-known branch of the Services where we map the seabed, describe the oceanography and coastal zone of wherever we happen to operate. Once I'd qualified as a Hydrographic Surveyor in 1992, I worked in most of the seas of the globe. Initially it was the English Channel but soon I'd ventured out into the vast expanses of the South and North Atlantic oceans as the Navigating and Operations Officer of HMS HERALD. That work involved lots of gravity surveying and also a deal of oceanography, and the work took me from the seas of Brazil to the waters off Greenland.

Marrying in 1994, I briefly thought about leaving the Navy to spend more time ashore, but the hydrographic bug bit deep when I was serving as second in command of Naval Party 1008 surveying the southern North Sea and Dover Straits. Dealing with complicated tides, emerging navigational technology and fascinating wrecks made me realise that I did quite enjoy what I was doing. Completing my International Hydrographic Organisation Category A course in 1996 I then brought HMS SCOTT out of build as the Navigating Officer. This handles like a lead brick but I enjoyed serving on board. We deployed together back to the Atlantic and on through the Mediterranean to the Red Sea and Indian Ocean. Given my own Command in 1999 I had the joy of switching back to Mine Hunting and then to work in Fisheries Protection. HMS LEDBURY was a hard job, but I learned a huge amount as her Captain. Posted to my first shore job in late 2000 I was looking forward to a couple of years commuting to work but was 'pinged' to go back to sea as second-in-command of HMS SCOTT. Three and a bit years on board her this time was a real whirlwind.

Our son arrived shortly after I had returned to sea; how my marvellous wife coped still impresses me. More time was spent east of Suez – and all around Africa, but all the gravity surveying, hydrographic and oceanographic surveys in previously uncharted waters (literally) eventually won me promotion and brief respite to study a Masters degree (through King's College London) in Defence at Shrivenham. Having the chance to re-engage with academics

was great. After Shrivenham and the arrival of our twin daughters, it was back to sea for a couple of years as the Commanding Officer of HMS ENTERPRISE. I joined in Mumbai, spent time off Somalia, in the Straits of Hormuz, off Saudi Arabia, Oman, Bahrain, sailed through the Mediterranean, deployed to West Africa (surveys off Ghana, Nigeria and Cameroon), South Africa, back up to the Gulf again and eventually left the ship in Gibraltar. After two years back at Shrivenham teaching on our MA programme for mid-seniority officers followed, it was off to Portsmouth and Navy Command to manage the Hydrographic, Oceanographic and Meteorological capability sets across the whole of the Navy. I had to bring the new Ice Patrol Ship into service. It was a huge team effort but HMS PROTECTOR sailed south for her first Antarctic surveys only 8 months after her ship's company had first stepped on board. Then there was a change. I was sent to post-revolutionary Libya as a Naval advisor, with the aim to help re-build their Navy following 42 years of neglect under the ravages of the 2011 revolution. Despite all of Libya's woes it is a stunningly beautiful country and the people are generous and warm. I was promoted again and then took charge, as the professional head, of all the Royal Navy's Hydrographic, Oceanographic, Meteorological and Geospatial Intelligence people, ships, bases and 'stuff'. I also became a non-executive director of the UK Hydrographic Office at Taunton. 3 years managing a globally deployed and multi-various portfolio was challenging but a real privilege. Being the 32nd Hydrographer of the Navy since 1795 was made so much easier by having a huge range of talented and capable people working with me. It was a real honour to serve them.

In late 2016 it was time for another change. I went back to Shrivenham in late November to study Arabic. Now I am the Defence Attaché of the United Kingdom in Libya (was for a year also covering Tunisia). Things in Libya had deteriorated significantly following the 2014 civil war and, as I type, Libya is back in civil war fighting against the forces of the recognised government in Tripoli. I remain optimistic and am working hard to bring people back around the table to negotiate a peaceful settlement but there are legion challenges. I do still use my Geology though. At an event for young Libyan entrepreneurs, I was discussing aquifer dynamics with one young Libyan and oil exploitation with another. I'd love to have time to explore the amazing geology of the southern mountains of Libya but may have to wait until there is slightly more stability. Just under one more year here and I eventually leave the Navy after 37 years of amazingly varied and challenging service. The academic thirst for knowledge and the spirit of inquiry that I first encountered at St Andrews (sitting on a rock outcrop in Mull) hasn't left me. I learned then that there isn't always an answer out there that someone knows and that each of us can contribute to the debate and understanding. Not sure what I will be doing next but, inshallah, all will be well.

Yours,
David C Robertson
Captain Royal Navy,
Ex-Editor of the GeolSoc magazine,
Defence Attaché Tripoli
@DRobertson RN

David Robertson, 5th from left

Jim Westland (BSc 1980) and his wife Moira visited St Andrews in July where they met your editor and alumna Rosalind Garton (BSc 1978). They enjoyed a few drinks in the Central Bar where they caught up with news. Jim runs an IT consultancy on the Isle of Mull but he still keeps his hand in with geology by leading excursion around the island.

Rosalind, Moira and Jim

Roxie Shaffiee

Roxie Shaffiee (BSc 2016) is now pursuing PhD research at Oxford. She was interviewed on the BBC in July at the Royal Society Science Festival where she helped with an Oxford University presentation celebrating the 150th anniversary of the Periodic Table.

1979 class reunion

Neville Taylor, Stephen O'Loughlin, John Berry, Clyde Leys, James Powell and Jill Howgate outside The Criterion Bar, St. Andrews

Six members (out of 11) of the 1979 Honours Geology class visited St Andrews at the end of August to celebrate 40 years since their graduation. They met up with ***Ed Stephens, Richard Batchelor*** and ***Rosalind Garton*** (BSc 1978) where they all enjoyed a few drinks at The Criterion Bar (this pub was the Friday evening destination for geologists in those days). The six alumni and Ed Stephens then went for a meal. Rosalind's class had shared a field trip to Scarborough with this class in 1977, an excursion organised by the late ***Dr Roy MacGregor*** who thought St Andrews students should be exposed to Mesozoic rocks.

In early October, ***Summer Mughrabi*** (BSc 1997) visited Fife and met up with her former yoga teacher and alumna ***Rosalind Garton*** (BSc 1978). Summer worked for Shell for twelve years living in the Netherlands and Norway. She then returned to the UK and retrained to be an interior designer and has spent the last decade having adventures in the worlds of hospitality interiors and art.

Rosalind and Summer

In September, alumna ***Lesley Andrews*** (née McDowell) (BSc 1974) visited St Andrews with her husband Richard, when they bumped into ***Richard Batchelor.*** They were on a tour of the world from their home in Cape Town, visiting friends and family in England and the USA. Lesley has now retired from working in the South African mining industry. They got back home in mid-October.

Lesley and Richard

1958 revisited

1958 field excursion to Cornwall

1. Peter Leggo
2.Ross Black
3. Douglas Carroll
4. Fred Hubbard
5. William Welsh (funder of the Welsh Bequest fund)
6. Liz Whitmore
7. Elizabeth McAree
8. Jan Hill (married Tim Phillips)
9. Stan Yeaman
10. Prof Charles Davidson
11. Maureen ?
12. ? Denis Hackett
13. ? Nigel Dyckhoff

After the photograph of the 1958 field trip to Cornwall was published in the July 2019 Newsletter, two alumni responded. Elizabeth Young (nee McAree) (BSc 1958) and Tim Phillips (BSc 1958) sent the Editor extra names for the people in the picture. The photograph is reproduced again with the extra names.

George Lees (BSc 1983) was in contact with ***Richard Batchelor*** last September. After graduating from St Andrews, George moved south to Manchester to undertake a PhD on trace fossils in Yoredale cyclothems. A job offer as a sedimentologist with the Ministry of Agriculture Fisheries and Food in January 1987, before write-up was completed (or, in truth, started), proved too tempting to resist. The next five years were spent working in the lab and at sea during the day, monitoring the health of the seabed, and toiling over an archive PC in the evenings, completing the write up.

To everyone's surprise he succeeded in late 1991 and, a year later, took up a job with SNH in Edinburgh as a coastal geomorphologist. Paid to visit the most remote and spectacular beaches and cliffs in Scotland, and to raise awareness and appreciation of our coastal landforms and processes, George describes this as the best job in Britain.

In 2009 an opportunity arose in SNH to work in the growing area of marine renewables. This entailed advising on the interactions of

wave, tidal and offshore wind turbines with marine wildlife, while supporting Scottish Government's ambitions to grow the sector as a means of reducing our reliance on fossil fuels. Based in Battleby, near Perth, this remains his core role, both challenging and rewarding in equal measure.
George recalls his time in the Geology Dept at St Andrews with affection and enthusiasm. "St Andrews was an amazing place to study Geology. I loved the strong field focus to our studies, and the great trips to Caithness, Assynt and Skye, alongside all the shorter ventures out to the shores of Fife. It was an incredibly sociable department too, perhaps down to the small class sizes and the amount of time spent out in the field (in the pouring rain). But I remember too how the staff would take their coffee breaks along with the undergrads, rather than separately. Small things like that leave a lasting impression."
George would love to hear from any former classmates. He can be contacted at:
George.lees@nature.scot

Helen Taylor (BSc 2003)
Helen is an energy consultant with over 15 years of international energy industry experience covering six continents and twenty-three countries. Helen holds a BSc from University of St. Andrews in Geoscience, an MSc from Royal Holloway College, University of London in Basin Evolution and Dynamics and an MSc in Geotechnical Engineering with Merit from the University of Dundee. Helen also holds an IPMA Level D Project Management Qualification, is a Fellow of the Geological Society and a Member of the Institute of Civil Engineers.

Helen is a director and owner of Lacus Resources Limited which was formed in 2016 to provide specialist geoscience, geotechnical engineering and project management services to the offshore energy sector. Lacus Resources now supports a wide range of businesses across their full project life cycles ranging from oil and gas to geothermal as well as offshore windfarms and energy storage.

Helen visited SEES in early November to give a lecture to the undergraduates on career opportunities.

Judith Kinnaird (MSc 1977, PhD 1987)
"I have theoretically retired from The University of Witwatersrand, South Africa, and had a retirement party which I organised for 50 colleagues and former students. However, I still have students to supervise for the next year or so and also there is no-one to take over my co-Director role of a national centre of excellence for the moment, and that is unlikely to happen before Easter so I will be staying on to run the Centre for a few months at least.
I did a lecture tour around South African Universities for the Society of Economic Geologists (SEG). I hope to continue these SEG lectures by going wider afield in southern Africa next year with plans to include Namibia, Malawi, Zimbabwe and other places as time and opportunity permit."

Alison Searl (BSc 1983). It is with sadness that we have been notified of Alison's death. She passed away in September 2018. After graduating from St. Andrews, she went on to Cambridge for her PhD. From there she took an academic post at Aston University, Birmingham, where she continued her research interests in carbonate geochemistry. From there she changed career and worked for the Institute of Occupational Medicine in Edinburgh, where she became involved in studying the health effects of volcanic dust during the volcanic eruption on the island of Montserrat. In early 2015, she and her family moved to Sutherland where Alison became Conservation Officer for the RSPB in Golspie. She is survived by her husband Tim and two children.
Her Honours project supervisor, ***Colin Donaldson,*** said: "I will never forget the undergraduate Honours dissertation she submitted on the Loch Ba ring dyke (Mull) - it was stellar in all aspects - field notes, map quality, illustrations and artwork, the account of the work and the well-argued interpretations of the geological relations. It was the best one I ever supervised or read. All her work was of that quality."

Alison Searl and husband ***Tim Griffiths*** on the 2013 reunion field trip

Chris Ravey (BSc 1990)

In the Autumn of 1988 Professor John McManus and Dr Rob Duck led a small band of geology students across the Tay for new beginnings at St Andrews. Dundee geology department, along with Strathclyde geology, had become casualties of higher education "reviews". As I recall it, the plan was that Dundee and Strathclyde geology department would merge with Glasgow into one big department at Glasgow University. Whilst the merger did go ahead, at least seven of us who had just completed second year at Dundee opted for the shorter transfer over the Tay Bridge, and in September of 1988 we joined the existing St Andrews University Geology department honours students on a field trip to southern Germany.

I have great memories of my time at St Andrews, but all too soon it was the summer of 1990 and graduation plans were being made. The job market wasn't great in the early 90's, and I think that a number of us went on to do MSc's or PhD's to prolong being a student (and to increase our chances of employment!). I was fortunate enough to be awarded a grant to undertake an MSc in Engineering Geology in Leeds.

My first job was with a civil engineering consultancy in Glasgow. James Williamson and Partners had just been acquired by Mott Macdonald, now an international multidisciplinary consultancy. Williamsons had a respectable reputation for the design of hydro power schemes, and accordingly, had a wealth of experience in the design and maintenance of underground structures and rock slope stability. This tied in well with my interest in rock climbing, and my knowledge of rope techniques was a perfect excuse for me to assist one of the senior engineering geologists with rock slope stability inspections. Back in the early 1990's, the use of industrial rope access was still in its infancy, so at that point I joined a small group of engineering geologists who were able to undertake tactile inspections of rock slopes which were difficult to access by more conventional methods.

After two years working in Glasgow, I had the opportunity to spend a year in Hong Kong. The geotechnical community was absolubtely buzzing in Hong Kong in the mid 90's, and it was a fantastic place to consolidate knowledge and learn an awful lot more. The new airport was being built, with all the associated infrastructure, and also a lot of land reclamation. In addition to the new construction projects, there was involvement with the ongoing slope stability and landslide issues which are invariably associated with developments on steep slopes in heavily weathered rocks and soils.

Back in Scotland I became involved with the construction of the rockfill causeway between North Uist and Berneray. This involved the identification of a suitable local rock source for construction material, followed by supervision of the rock extraction process. During construction of the causeway I was fortunate to be based on North Uist, giving plenty of opportunities to explore the Outer Hebrides by foot and sea kayak, and not for the last time, I realised how lucky I was to have chosen geology as a career.

Following a year working in Gibraltar in 2000 I decided to set up Ravey Consulting Ltd, providing engineering geological consultancy services and specialising in rock slope engineering and rope access inspections. The last 19 years have been an interesting journey through the worlds of business, civil engineering and engineering geology. Some of the highlights have included a 5-day boat journey from Cape Town to St Helena (pre-airport days) to inspect the impressive rock slopes above Jamestown harbour, a month in a desert camp in Saudi Arabia logging core for a proposed open pit gold mine, and abseiling over the walls of Scotland's most prestigious castle at sunrise to look at the slopes below. In recent years I have spent a lot of time in the company of younger Engineering Geologists, mentoring and scrutineering for C.Geol, setting up ropes on steep slopes and sharing experience during inspections and design work. The future is bright. The next generation of geologists are active, well-trained, enjoyable to be with, and most importantly, still appear to have a healthy sense of humour!

OUTREACH

The Geological History of Scotland – Summer Short Course

In early July, 20 students from James Madison University, Virginia, USA, joined SEES to immerse themselves in all things Earth Science as part of an annual program that gives JMU students the opportunity to gain general education credits (required as part of their undergraduate degree).

Having been warned to pack warm layers and waterproofs, the students were greeted instead by warm sunshine and blue skies, of which full advantage was taken with the first afternoon spent surfing on the West Sands!

The academic side of things then kicked off with an introduction to geological time and an introduction to the different rock types, providing a foundation for the students to learn about the different aspects of Scotland's geological past through lectures, practical sessions, and fieldtrips (including local favourites such as the Rock & Spindle, mapping at St Monans and investigating the sedimentary record along the East Neuk coast).

There was also plenty of time for exploring and adventures with a group trip along the Elie chain walk (twice – once on the chains and once in the water as part of a Coasteering activity!), a visit to the Aquarium, whisky tasting at Kingsbarns, putting at the Himalayas, a hike up Ben Vrackie for views over the Cairngorms and a puffin-spotting boat trip to the Isle of May.

The course finished with a condensed version of the first year Highland Fling fieldtrip over three days, taking in classic localities in the Grampian, Northern Highland and Hebridean terranes as well as picturesque landscapes in the NW Highlands, Loch Ness and Glencoe. Luckily the midges only really found us at one stop!

On returning to St Andrews there was just enough time to sit the final exam and pack suitcases before a last night group dinner (BBQ abandoned due to the final arrival of typical Scottish 'summer' weather) followed by ceilidh dancing the night away.

Jen Brooke, GeoBus co-ordinator

GOOD NEWS FOR GEOBUS

Verus Petroleum, thanks to the outstanding efforts of ***Russell Reekie*** (BSc Geoscience 2003), last September awarded SEES £550,000 for GeoBus and related outreach activities.

We want to acknowledge the heroic efforts of ***Jen Brooke*** and ***Claire Cousins*** in never flagging at keeping the GeoBus ship afloat. We also need to give a hearty thanks to and acknowledge former academic Ruth Robinson whose energy and drive gave birth to GeoBus almost a decade ago. There is no doubt that Ruth will have an enormous smile on her face. This now offers us an opportunity to get our outreach, impact and recruitment strategies in order and efforts will be made over the coming weeks and months to ensure that Jen's position becomes permanent.

geoHeritage Fife

Richard Batchelor (Chairman) has initiated two new trail leaflets which are in final draft form. One covers the geology of Elie and the other deals with the building stones and general geology of Crail. Both have been part grant funded.

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'History and Development of Geology at St. Andrews' book

Copies of this definitive history of the subject at St Andrews are still available from ***Richard Batchelor***. A charge of £4 (€5) is requested to cover P+P.


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Irvine Building

USEFUL LINKS

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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)

Front Cover photo: Section through an esker, St Fort, Fife (Richard Batchelor)