HISTORY IN MOTION

As our understanding of the Earth continues to evolve so do the careers of the people who study it. **Dave Hall** takes a look at the exciting options a UK geology degree can open up

Planet Earth is dynamic and complex. Humans have always tried to control and exploit the globe's immense and unpredictable power, but it is only relatively recently that the geological sciences have really begun to understand it.

Geology – or Earth science – is a broad discipline that explores the processes that shape the Earth. It tries to unravel the planet's origins, map its oceans and rivers, and ultimately discover how we got here. As well as trying to decipher the Earth's story, geologists study how we can manage, exploit and conserve its natural resources. We need trained geologists to find and extract materials, and to discover ways of satisfying our huge appetite for energy – not just by extracting fossil fuels, but by making better use of alternative energy sources.

With devastating earthquakes, volcanoes and tsunamis happening regularly across the globe, it is little wonder the skills of geology graduates are highly sought-after. 'Geology and Earth science graduates are in huge demand by employers,' says Jan Alexander, Professor of Environmental Earth Science at the University of East Anglia (UEA). 'Mining, fossil-fuel extraction, natural-hazard mitigation – all these and many other things require Earth scientists.' And, thanks to the many transferable skills you learn on an Earth sciences degree, graduates will be able to find jobs in a surprisingly wide range of industries.

Key location

With more than 11,000 miles of coastline and varied topography, the UK is the ideal place for geological study. There are about 60 universities offering Earth science courses in the UK – several of which are world leaders in the subject. There are almost as many names to describe the subject too, ranging from geoscience to environmental science and Earth science.

At UEA, for example, which is well-known for its breadth of environmental science subjects, the term 'geology' isn't really mentioned. 'I think most people, including me, don't make much distinction between Earth science and geology,' says Alexander, 'but perhaps Earth science is a bit broader than geology, and tends to include disciplines such as geophysics and geochemistry.' Environmental Earth science tends to concentrate more on subjects such as natural hazards, water resources and pollution than traditional geology or Earth science degrees do.

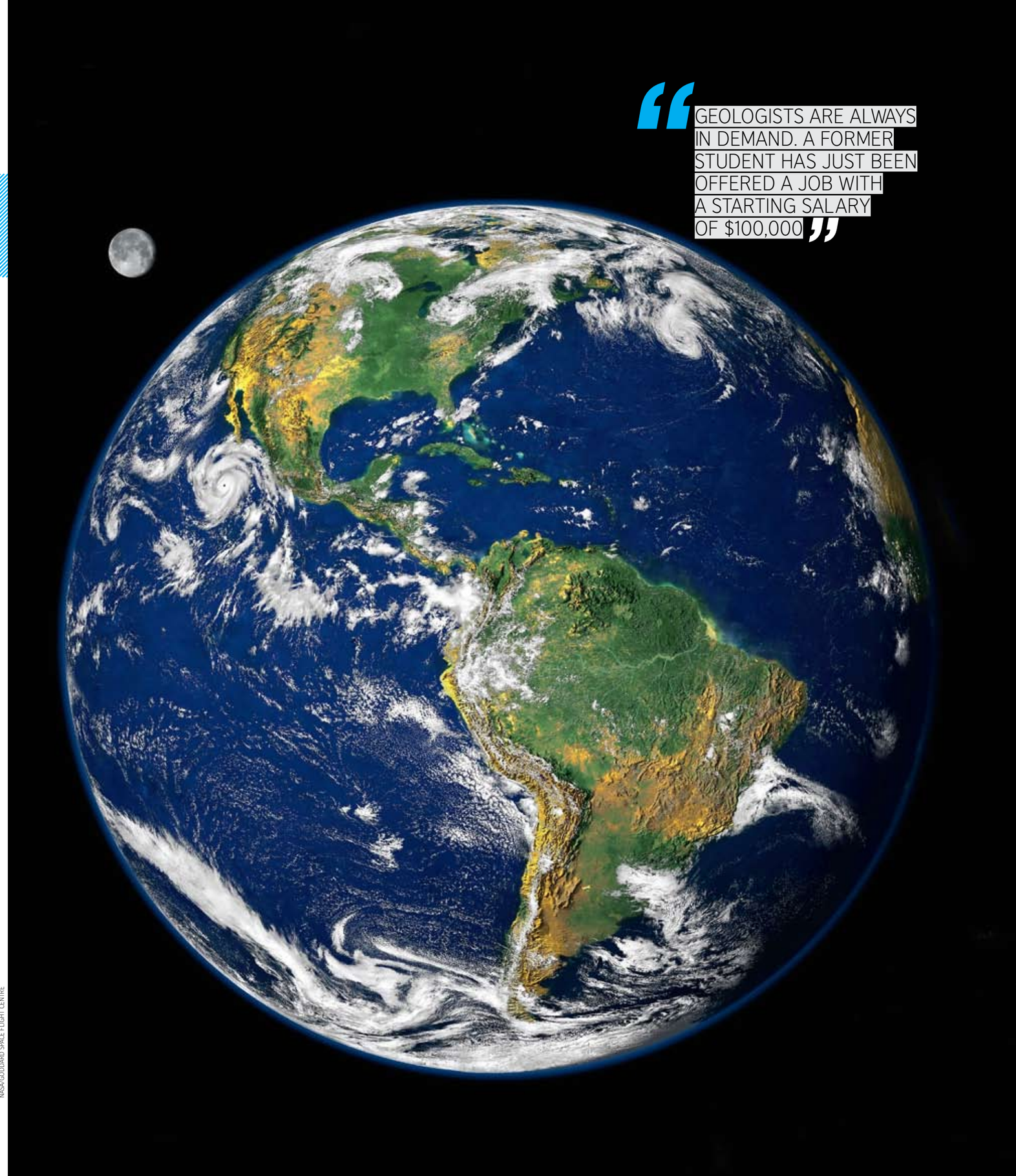
A broad discipline

Most universities offer three-year BSc and four-year MSc or MGeol degrees. Whether you choose a four-year or three-year course, a typical first year will focus on a diverse but related set of core subjects such as physical geology (the building blocks of rocks), mineralogy, paleontology, stratigraphy (layering), surface processes and mapping. You're also likely to come across physics, maths and chemistry, all of which will be useful when working in the scientific community. 'We believe in breaking down the barriers between these related sciences, so climatologists, geologists and geophysicists and so on can all exchange information more easily,' says Alexander.

In the second year, you can continue to study a wide range of disciplines or specialise in various subsets, such as engineering geology, marine geology, geophysics or oceanography. 'Volcanology and paleobiology tend to be the most popular subjects at first, as they get the most publicity,' says Professor Gawen Jenkin, Senior Lecturer in Applied Geology at the University of Leicester. 'But by the end of most courses, other specialisms and interests tend to emerge.'

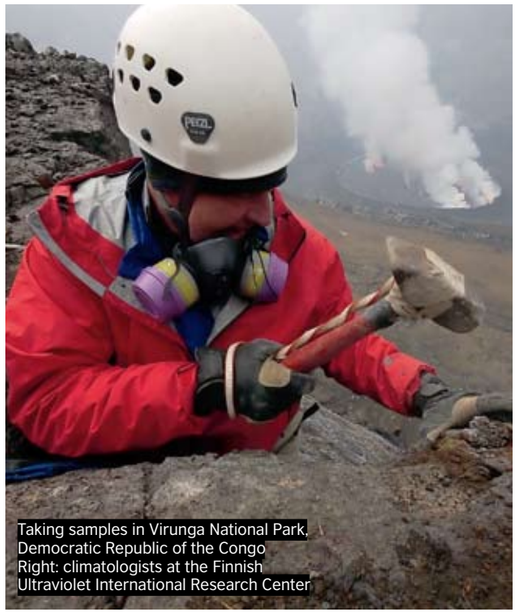
It is common for universities to offer a broad foundation, continues Alexander. 'Many of our courses are cross-disciplinary. Some of our students choose to take a lot of maths modules with environmental Earth science – an unusual and extremely useful combination. Others, meanwhile, opt to study renewable energy – for siting wind turbines for example – and others still are interested in volcanic and seismic hazards or ground-water supply. We also teach the economic and risk assessment angles.'

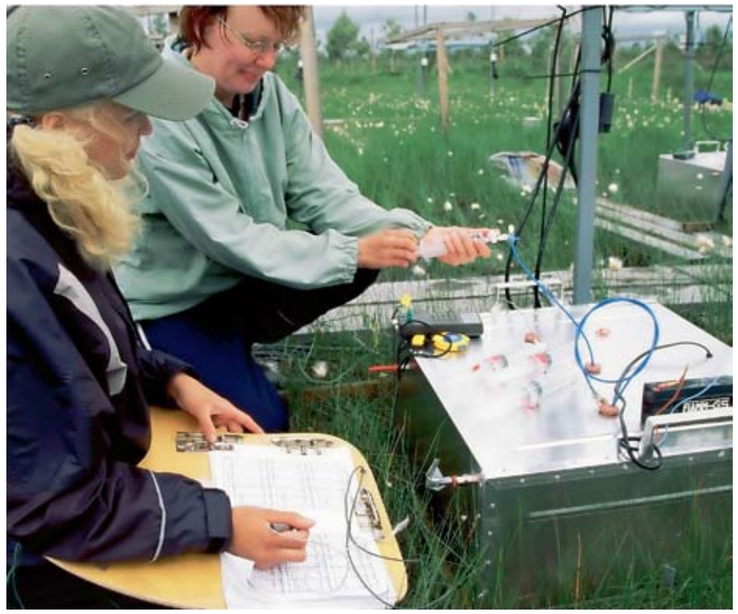
Yet it's the fieldwork that many students find the most enjoyable. The first year will involve an introductory field project of a week or so, where you'll begin to learn field skills. »



> "GEOLOGISTS ARE ALWAYS IN DEMAND. A FORMER STUDENT HAS JUST BEEN OFFERED A JOB WITH A STARTING SALARY OF $100,000"

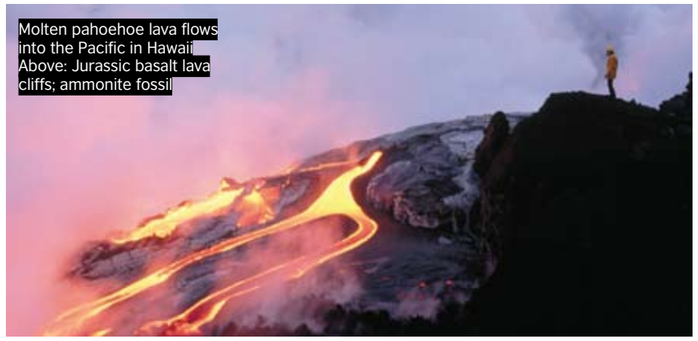
NASA/GODDARD SPACE FLIGHT CENTRE





CARSTEN PETER/NATIONAL GEOGRAPHIC SOCIETY/CORBIS; DAVID HAY JONES/SCIENCE PHOTO LIBRARY

Taking samples in Virunga National Park, Democratic Republic of the Congo
Right: climatologists at the Finnish Ultraviolet International Research Center



THOMAS KITCHIN & VICTORIA HURST/FIRST LIGHT/CORBIS; MAURICE NIMMO/FLPA; ROGER RESSMEYER/CORBIS

Molten pahoehoe lava flows into the Pacific in Hawaii
Above: Jurassic basalt lava cliffs; ammonite fossil

> A SURVEY SHOWED 95 PER CENT OF GEOLOGY STUDENTS AT UK UNIVERSITIES WERE SATISIFIED WITH THEIR COURSES

At UEA, Environmental Earth Sciences undergraduate Charlene Ting, originally from Malaysia, did a variety of work on her first-year field course. 'For the geophysics field study, we surveyed the site of an ancient Roman village in Suffolk and discovered the course of ancient rivers,' she says.

It's a similar story for Amelie Leduc from France. A PhD student at Durham University, Leduc helps undergraduates with practical work and fieldwork. 'Every March we go to the Lake District with the first-years,' she says. 'We teach them the basics such as different types of rocks and processes. Field trips are part of the course and there are at least one or two trips in each undergraduate year.'

Field days can be long and involve a lot of clambering around on rocks in the rain – and you'll have to get your hands dirty too. But most students agree that it's great fun as it drags you away from your textbooks into real geology. And it's also a chance to make new friends. 'Fieldwork is not only important for practical and academic reasons,' says Jenkin. 'It also helps to build relationships with staff that you'd be unlikely to build studying any other subject at university.'

In subsequent years, it gets even better. 'In the first year we usually visit the Isle of Arran in Scotland, which has an extremely rich geological history,' says Jenkin. 'Then, depending on the course, you could be visiting southern Spain, the Alps, or even California to study desert landforms. We also encourage students in their third year to undertake their own field study.'

This might sound a bit like an expensive holiday, but field studies are a vital part of geologists' work. 'It's not cheap but it's really valuable experience,' says Leduc. 'And at Durham there's often a subsidy and sponsorship from the college, industry or professional organisations. Students get involved in mini-projects and get sponsorship for those, or grants for field trips.'

The price is right

UEA's Alexander admits that field studies can make geology expensive. 'We took 35 students to mainland Greece and then Santorini for two weeks last year, and although the university covers 50 per cent of the costs, the students have to cover the rest.' But she believes it is worth it, as this is where students learn essential field skills, get used to the latest technology, and put into practice the latest scientific techniques. 'At the end of it all they are probably more employable than graduates of many other degrees.'

On top of fieldwork excursions, most universities offer a year abroad or an industry placement on their courses. At UEA, for example, you can take a BSc in Environmental Earth Science with a year in Australasia or Europe. So it's no wonder geology students are among the happiest with their degrees. A 2008 national student survey put them top of a final-year satisfaction league, with 95 per cent of geologists at UK universities satisfied with their course. And that still seems to be the case, according to Jenkin. 'Last year a Unistats poll revealed that 96 per cent of our geology students were satisfied with their course.'

The next step

'Most of our students who do the three-year programme go on to do an MSc or PhD,' says Alexander. A 2010 Higher Education Statistics Agency study reported that 22 per cent of first-degree geology graduates were in further study. Indeed, the current trend is towards taking a four-year MSc or MGeol degree – instead of the three-year alternative – as it makes you more employable. That extra year gives you specialist skills that many employers in geological fields now expect. You can usually swap from BSc to master's before the end of the first year if you want to.

To get on to a first degree as an international student, you'll need anything from 28 to 42 International Baccalaureate points, depending on your college or course of choice, or a UCAS tariff of 240 to 650 points (from A-levels or equivalent). You would usually need two sciences, while maths, environmental sciences, engineering, physics, chemistry and biology are all useful.

When it comes to the job market, geology graduates are spoilt for choice. There is a wide range of geological professions to choose from. On top of that, geology graduates possess a set of enviably transferable skills for more general positions. You'll leave university with communication, organisation and research skills, plus an ability to work to deadlines, think critically and creatively, and make decisions.

You'll be confident with fieldwork, project management and risk assessment, and you will have picked up superior reasoning and analytical skills. As someone who can appreciate complexity and change, you may also have developed an ability to deal with the unexpected. Finally, you'll have improved numeracy and information and communication skills.

A world of possibility

All this means you could end up doing anything from environmental planning or marine studies to finance or PR. Dr Helen Bray, for example, graduated as a geochemist and later obtained her doctorate in mineral sciences. Ten years on, she finds herself working as a CO_2 Policy Adviser at a multinational oil giant. 'There's no PhD required for what I do,' she says. 'But the skills you learn as an undergraduate are very relevant and transferable.'

Many geologists work as contractors, rather than working for a single company. Steve Pack, 39, is a good example. Since he got his MSc some 16 years ago, he has worked all over the world, from London (on its Jubilee Line tube extension) to Sierra Leone (where he recently supervised the infrastructure for the Marampa mine, which will soon be the biggest iron-ore mine on the planet). 'I like to work contracts as they're usually quite lucrative, and then I can spend the rest of the year doing what I want,' he says.

Jenkin points out that the majority of geology graduates from the University of Leicester find it easy to take the next step forward in their careers. 'Some 82 per cent of graduates got jobs or went on to do further research – and, crucially, 88 per cent of those in work were in graduate-level jobs,' he says.

'Geologists are always in demand,' he continues. 'This is partly driven by the recent increased demand for resources – particularly from countries such as China. We had a student last year who had only just finished his BSc when he told us he had been offered a job at a mining firm in Africa and was on a starting salary of $100,000.'

Durham's Leduc also has exciting plans. 'In the summer I am going to work for a French oil exploration company,' she says. 'Quite a lot of students manage to find a job following their internship or through their project's sponsors thanks to the department's contacts.'

Pack is also confident. 'There are loads of geology and engineering agencies out there,' he says. 'In 16 years I haven't had to search for a job for more than a week.'

Wherever you end up – on a rig in the Gulf of Thailand, a ship in the Antarctic or at an African iron-ore mine – you'll find it was worth getting your hands dirty after all. ■

MY EXPERIENCE

NAME Romina Degiorgio
FROM Malta
COURSE MGeol in Geology with Geophysics, University of Leicester

In a few months I will graduate from the University of Leicester with my MGeol in Geology with Geophysics. Looking back, I can't really think of anything that would have made my experience better. The city is small enough not to be overwhelming but large enough to make for an enjoyable shopping trip and there are always plenty of festivals and other activities going on. The university is friendly and vibrant, is multicultural and there is a society (or two!) for every kind of person. The Geology department has become my second home. It has all the necessary facilities, computer rooms and teaching areas, as well as a common room in which we can take a break whenever we need it.

I entered university with a vague interest in the Earth sciences and a good deal of confusion about what I wanted to do with my life. My time here has given me a wonderful passion for geophysics and a certainty that I really do not want to do anything else. The lecturers are leaders in their field and no one could be more patient with the endless knocks on their office doors. The department is small enough so that everyone knows and helps each other – especially in fieldwork, where you make new friends through your shared adventures. There are lots of stories to tell your friends and family back home. The Alps field trip last summer was particularly fun.

These four years have been amazing and I have learned so much – not just about geology, but about myself. I have grown up a lot from the teenager who took that plane to the UK for the first time. There have been parties, society meetings and lots of good work – all of which have helped me forget to feel lonely or homesick.

The one piece of advice I could give prospective international students is: do not let fears hold you back. If you have any worries or questions, there is always someone who will help if you just ask.