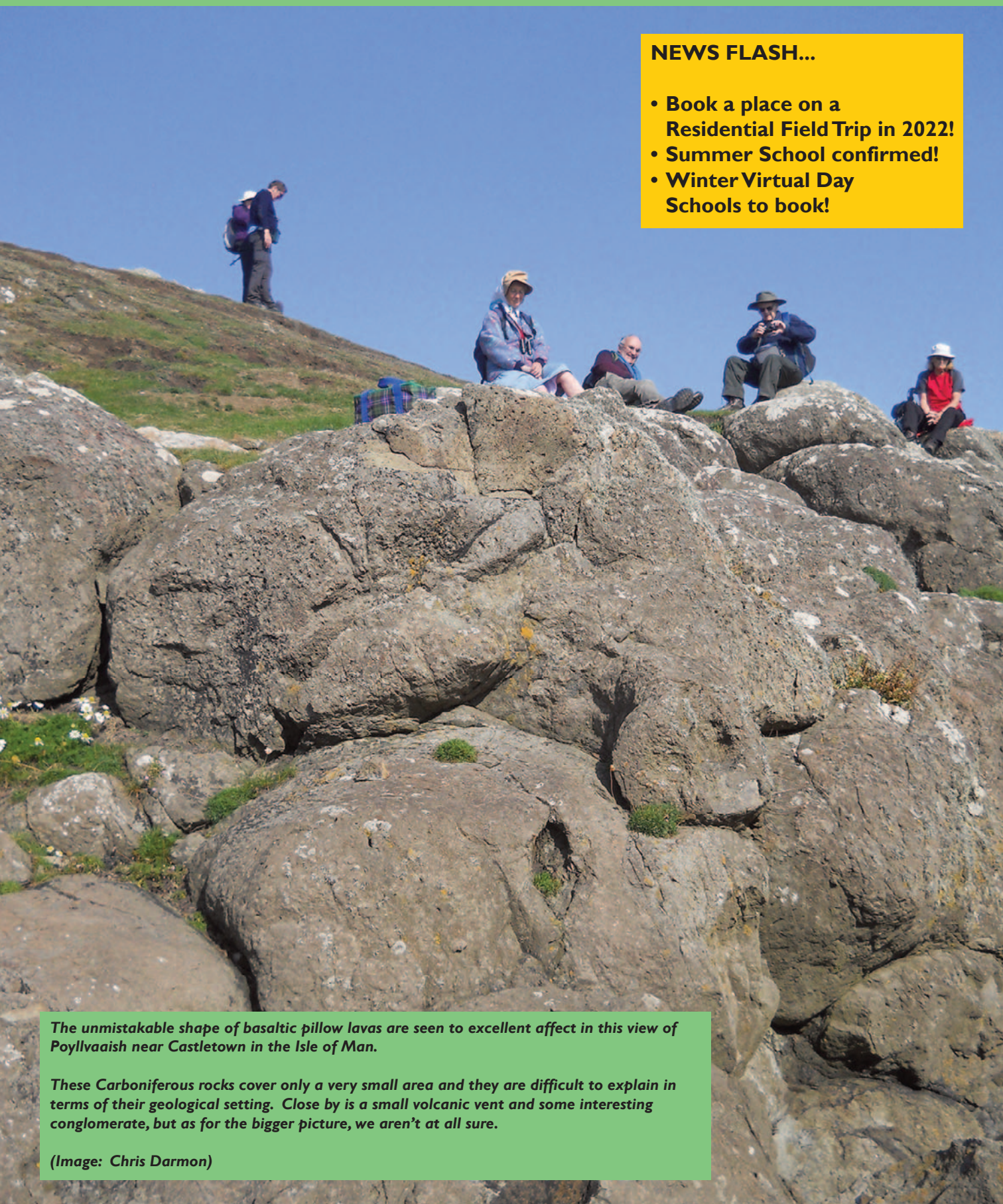
Down to Earth extra

Issue 110 February 2022

NEWS FLASH...

- **Book a place on a Residential Field Trip in 2022!**
- **Summer School confirmed!**
- **Winter Virtual Day Schools to book!**



The unmistakable shape of basaltic pillow lavas are seen to excellent affect in this view of Poyllvaaish near Castletown in the Isle of Man.

These Carboniferous rocks cover only a very small area and they are difficult to explain in terms of their geological setting. Close by is a small volcanic vent and some interesting conglomerate, but as for the bigger picture, we aren't at all sure.

(Image: Chris Darmon)

From the Editorial team...

Every now and again something happens which renews your faith in the human spirit, and gives you hope for the future. Chris remembers that when he taught geology at Chaucer School in Sheffield there were the usual mix of kids for whom geology must have been something that happened twice a week between certain times of the day and a few others for whom it was the highlight of their week.

When youngsters have a real talent for something that normally comes with a general level of academic ability. We used to call them 'clever kids'. These days they are more often called 'gifted' and teachers work hard to develop that natural ability and nurture their interest. However, in one or two instances that interest, or passion, came for a single area of the subject. That can be the case with dinosaurs, especially in younger children or more generally palaeontology.

Perhaps you'd have been able to recognise that in a young Mary Anning. She went on to develop a lifelong passion for collecting fossils. More that she became an expert on Ichthyosaurs and fossils in general. The great and the good came to Mary for advice and new material. But that was 200 years ago. What relevance does this have to today?

Fast forward to a young man from a working class background, not academcally gifted and brought up on an estate in Doncaster. He has almost no formal qualifications but he has a passion for fossils. He goes to a dinosaur reserve in the USA for work experience. He's accepted onto a masters course without ever taking an undergraduate degree. He then studied for a PhD and becomes an acknowledged expert in Ichthyosaurs, just like Mary Anning. You may have seen him on TV recently, he's Dean Lomax, Yes, Deans story renews my faith that in geology, an amateur can still become an expert. Long may that situation continue!

Chris Darmon & Colin Schofield
The Down to Earth editorial team

See pages 7-10 for the full spectrum of our 'real' and virtual events!

news update

Tonga covered by a carpet of ash and suffers major tsunami damage after under sea volcanic eruption...

It's a tiny island, but it sits on top of a major undersea volcano. Ash from the eruption has covered nearby Tonga and the island nation has also been damaged by the resulting tsunami. (Image: 1NewsNZ/Twitter)

Prior to January 14/15th very few people will have heard of the Hunga-Tonga-Hunga-Ha'apai volcano but the people of the remote Pacific island nation won't forget the damage it has done to their property and livelihoods. The volcano formed a small surface feature but the resultant explosive emption was large enough to be seen from space.

This was published by the Smithsonian/USGS on their weekly volcanic activity report:

"Large eruptions at Hunga Tonga-Hunga Ha'apai on both 14 and 15 January produced plumes that reached the stratosphere and caused significant regional effects. Activity on the 14th apparently removed approximately the middle third of the island that had been expanded over the previous few weeks, revealed by a Planet Lab image acquired at 15.25 on 15 January. About two hours after that image was taken, an even stronger eruption produced a stratospheric plume seen in satellite images, sent pressure waves across the atmosphere, and caused tsunami that traversed the Pacific. Following these explosions, a Sentinel image acquired on 17 January showed that most of the previous combined island had been destroyed, leaving only small parts of the NE island of Hunga Tonga (200 m long) and the SW island of Hunga Ha'apai (700 m long) above the ocean surface."

Read the full report at:
https://volcano.si.edu/reports_weekly.cfm#vn_243040

Since the initial eruption, the focus has been on the damage that has been wrought to the scattered inland settlements that make up Tonga. Amazingly, there appear to have been only three deaths and a relatively small number of injuries. However there has been

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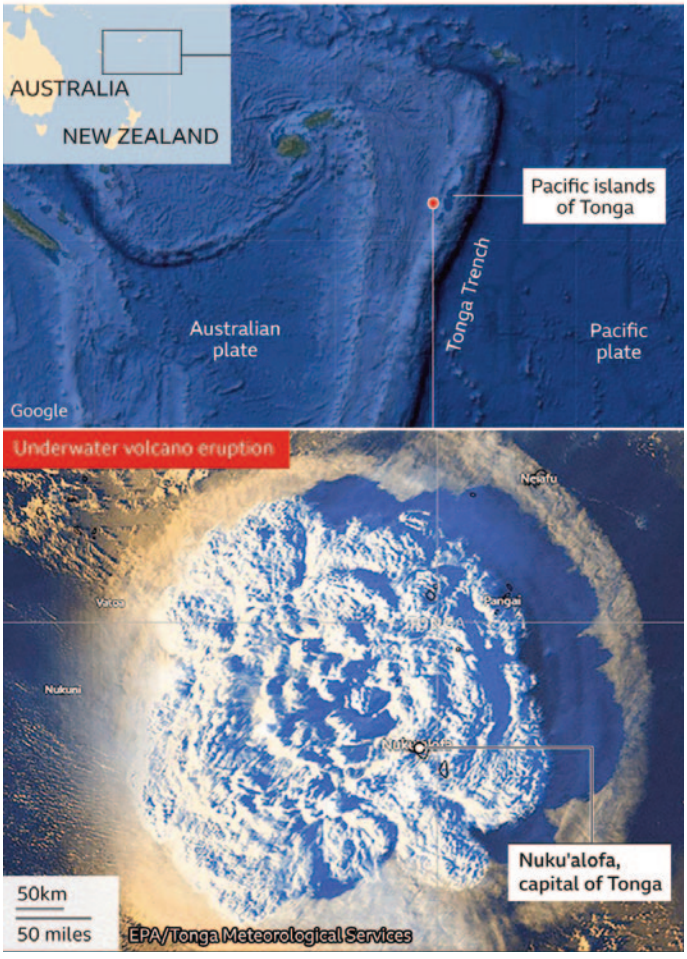
widespread damage to buildings, infrastructure and loss of crops. Some of this has been caused by the blanket of ash that covers the area and also from the impact of the tsunami wave that followed the eruption.

The tectonic setting of the Hunga-Tonga-Hunga-Ha'apai volcano shows that it sits close to the where the Pacific Plate is being



Tectonic map showing the tectonic position of Tonga (top) and the eruption as seen from space (bottom). (Image: USGS)

subducted beneath the Australian Plate at the Tonga Trench. It is the deepest trench in the Southern hemisphere and the second deepest on Earth after the Mariana Trench. The fastest plate-tectonic velocity on Earth is occurring at this location, so active volcanism is to be expected.

As late as January 22nd, the ***Volcano Discovery*** website was recording the movement of sulphur dioxide from the eruption, which at that time had reached the atmosphere above Madagascar. Such gasses can have a marked affect on the weather.

NASA has been tracking the eruption of Hunga-Tonga-Hunga-Ha'a-pai volcano since it began in December 2021 and especially since the violent eruption of mid-January. Jim Garvin and colleagues from NASA have been regularly compiling digital maps of the island using a combination of satellite data and surface geophysics.

Over a matter of a few months since April 2021 there have been dramatic changes to the island. What was one larger island has been reduced to just two small remnants that had been joined by the 2015 eruption. In effect, most of the former island has been blasted away and destroyed by the January 2022 eruption.

It will be interesting to see what happens to the volcano in the coming days, but it rises some 1800m from the seabed and covered a wide area being some 20km in diameter. We await the results of an underwater survey to see what remains today.

In recent days, the aid effort has been accelerated with both the airport and harbour once again open. Several countries including Japan, Australia and New Zealand have been in the vanguard of bringing much needed supplies including fresh water, food and constructional materials. The single undersea fibre optic cable has also now been repaired.

Read the full NASA account at: https://earthobservatory.nasa.gov/images/149367/dramatic-changes-at-hunga-tonga-hunga-haapai

Goldscope Mine in the Newlands Valley, something you may not know...

The Newlands Valley in the Lake District isn't the most famous of all the valleys in the National Park, but it is beautiful and it may be one of your favourite 'secret places'. One of the gems of the Newlands Valley, for the geologist at least is Goldscope Mine, a once thriving lead and copper mine.

Nowadays Goldscope Mine is a listed monument in the care of Historic England, but many will not know that we owe it all to

Inside one of the 16th century levels at Goldscope Mine (Image: Mindat.org)

German miners who came over at the behest of Elizabeth I. She needed copper to fight an upcoming war with the Spanish and the Germans were acknowledged experts of their day at finding such minerals.

Luckily for the Queen, the German mines came up trumps, finding significant veins of copper bearing minerals. At the time it was named "Gottsgabt" which translates as God's gift. Over time this became Goldscope.

We're grateful to DtoE reader Peter Lane for bringing this item to our attention. It appeared in The Guardian 17th January 2022 and was submitted by Carey Davies.

Giant Millipede found in Howick Bay, Northumberland

When we report, as we often do, on landslips that affect our coastline, there are sometimes some unexpected consequences. One such occurred in January 2018 in Howick Bay, on the Northumberland coast.

Howick Bay where the millipede was found (Image: University of Cambridge)

The fossil was discovered in a large block of sandstone that had fallen from a cliff to the beach at Howick Bay in Northumberland. "It was a complete fluke of a discovery," said Dr Neil Davies from Cambridge's Department of Earth Sciences, the paper's lead author. "The way the boulder had fallen, it had cracked open and perfectly exposed the fossil, which one of our former PhD students happened to spot when walking by."

The specimen identified by the researchers was found in a fossilised river channel: it was likely a moulted segment of the *Arthropleura's* exoskeleton that filled with sand, preserving it for hundreds of millions of years. It was found in 326 million year old Carboniferous strata.

Stainmore Formation (Serpukhovian)
Howick, Northumberland, UK
Specimen size: L: 76 cm / W: 36 cm / 2736 cm^2
14 tergites
Estimated animal length: 1.9-2.6 m

The fossil was extracted in May 2018 with permission from Natural England and the landowners, the Howick Estate. "It was an incredibly exciting find, but the fossil is so large it took four of us to carry it up the cliff face," said Davies.

The fossil was brought back to Cambridge so that it could be examined in detail. It was compared with all previous records and revealed new information about the animal's habitat and evolution. The animal can be seen to have only existed in places that were once

This is the Arthropleura as found in the sandstone strata (Image: University of Cambridge)

located at the Equator, such as Great Britain during the Carboniferous. Previous reconstructions have suggested that the animal lived in coal swamps, but this specimen showed Arthropleura preferred open woodland habitats near the coast.

There are only two other known Arthropleura fossils, both from Germany, and both much smaller than the new specimen. Although this is the largest *Arthropleura* fossil skeleton ever found, there is still much to learn about these creatures. "Finding these giant millipede fossils is rare, because once they died, their bodies tend to disarticulate, so it's likely that the fossil is a moulted carapace that the animal shed as it grew," said Davies. "We have not yet found a fossilised head, so it's difficult to know everything about them."

The great size of *Arthropleura* has previously been attributed to a peak in atmospheric oxygen during the late Carboniferous and Permian periods, but because the new fossil comes from rocks deposited before this peak, it shows that oxygen cannot be the only explanation.

The researchers believe that to get to such a large size, *Arthropleura* must have had a high-nutrient diet. "While we can't know for sure what they ate, there were plenty of nutritious nuts and seeds available in the leaf litter at the time, and they may even have been predators that fed off other invertebrates and even small vertebrates such as amphibians," said Davies.

Big fossils demand a heavy approach to extraction! (Image University of Cambridge)

Arthropleura animals crawled around Earth's equatorial region for around 45 million years, before going extinct during the Permian period. The cause of their extinction is uncertain, but could be due to global warming that made the climate too dry for them to survive, or to the rise of reptiles, who out-competed them for food and soon dominated the same habitats.

The fossil will go on public display at Cambridge's Sedgwick Museum shortly.

Material used in this item is courtesy of the University of Cambridge

Icelandic facility stores carbon dioxide in rocks...

In Iceland, a new facility called Orca is pulling carbon dioxide from the air and storing it underground in rocks. Climeworks is the company that owns Orca. Adelaide Calory-Muzak is an engineer at Climeworks, she says: "At the rate we're going, we're going to need to be removing CO2 from the air as well as reducing our emissions," adding that "the approach is vital to solving climate change."

At the facility, fans push air into filters, which trap carbon dioxide. When heated, the filters release the gas so it can be mixed with water. The carbon is then pumped underground where it turns to rock. The aim is to trap 4,000 tons of CO_2 a year in the first instance, before scaling up in the future.

Hornfels, but not as you know it...

I thought you might enjoy this sentence which I found on a web page about how to identify hornfels.
`Hornfels does not display foliage.'
It's so much better than foliation!

Peter Barnes

in-house

All change at Suunto compasses with supply and price issues...

We've recently been informed that the Finnish company behind Suunto compasses is going through the process of being taken over. At the moment the UK distributor still has decent stocks of most models but is already aware that prices are going to rise and there will be short term supply problems over the coming months.

The message here is that it you need any of their products - get you order in now!

The Suunto MC2 compass clinometer has been a firm favourite of geology students over many years.

Better news from US compass manufacturer Brunton

In the last issue, we told you about Brunton compasses in the US, who had dismantled their European distributor and we feared that they may not be available going forward.

We have now made contact at the highest level and the CEO and owner, Lauren Heersch, has assured us that they will still be supplying their excellent compasses into the UK.

Geo Supplies is now able to deal directly with the factory in the US and we are even able to get slightly better terms than we used to enjoy. Lauren is also looking to stocking more of the popular models balanced for Europe, which should have the effect of reducing lead times for orders.

We are getting really short of some rock and mineral specimens...

We supply rocks, minerals and fossils to schools and individuals and are short of some supplies. We are currently in need of plagioclase and peridotite. ***Please contact: lensims@geosupplies.co.uk***

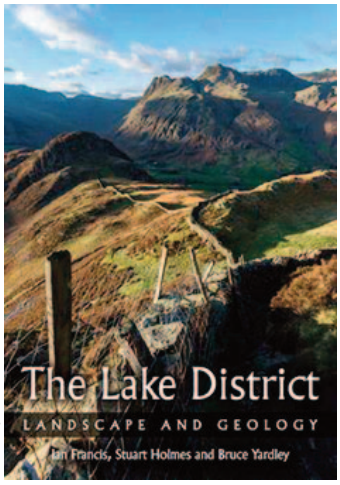
New Lake District book...

We're pleased to announce the arrival of a new title from Crowood Press!

Hot on the heels of Tony Waltham's "Peak District" comes this book on. the Lake District.

We firmly expect it to be a bestseller!

The price, including postage in the UK - is £20.00



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get Down to Earth regularly...

If you've enjoyed reading this Down to Earth extra, you'll love our quarterly Down to Earth! It's a 32-page quality magazine in full colour that's packed with up to the minute geological news and articles. You can get your hands on this either in print or electronic formats.

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Down to Earth

'Earth science learning for all'

Book now for our 2022 programme of residential trips

This is the Permian Hopeman Sandstone near Lossiemouth on the coast of Moray and Nairn. It's just one of many memorable sites that we will visit in July 2022. (Image: Chris Darmon)

With the lifting of the so called 'plan B' Covid restrictions, it's all looking good for our residential field trip programme for 2022!

We are especially pleased that we have the go ahead for our long delayed Summer School at the University of Worcester. This August event already has 30 people signed up and raring to go!

Several other trips are full or very nearly so. If you want to join us, do take a look at the brochures on our website and then contact us for a booking form.

For 2023 we are planning a return to Iceland, there's something to look forward to!

To view a brochure, go to our to website at: www.geosupplies.co.uk or Tel: 0114 245 5746
Booking forms are only available direct from us.
Email: downtoearth@geosupplies.co.uk

The 2022 programme - the full list

- North Cornwall - April 2-9
- Raasay & Skye - April 21-28
- Northwest Highlands - April 29-May 6
- Dingle Peninsula - May 18-25
- Mull & Ardnamurchan - June 4-11
- Pembrokeshire - June 25-July 2
- Northeast Scotland - July 20-27
- Worcester Summer School - August 13-20
- Berwick & the Borders - September 1-8
- Minehead, Somerset - September 14-21
- Malvern Hills - September 28-October 2
- Yorkshire Coast - October 10-15

Full refund, if we, or you, have to cancel due to Covid-19. Everyone booking will be required to have completed a Covid-19 vaccination programme in good time and to be 'fit to travel'.

Brouse online at www.geosupplies.co.uk or ring us on 0114 245 5746
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If you haven't joined one of our residential field trips before, what can you expect?

- *Our residential field trips are suitable for adults of all levels of interest and geological knowledge.*
- *Our trips are friendly and informal and mainly comprise 15-20 people. Overseas trips are usually larger.*
- *We usually use comfortable small hotels and guest houses and all meals are included.*
- *You have the services of Chris Darmon and Colin Schofield as field leaders. Both are highly experienced and knowledgeable field geologists.*
- *During the current period, even if we have a minibus you will be able to use your own car if you wish.*
- *Dates shown in this listing are the start and finish dates.*

If you still have any questions or queries, don't hesitate to email us at: downtoearth@geosupplies.co.uk or tel: 0114 245 5746

P*articipants on the South Devon trip at Start Point in October 2021. Colin Schofield is the one wearing the sun glasses and the hat.*

The 2022 Residential Trip programme...

We're really looking forward to the coming season of field trips, commencing with North Cornwall in early April. Bookings are looking good with a number of trips either full or very nearly so. We want to confirm hotel boomings as soon as possible so urge you to make contact now if you are wanting to join us.

We are pleased to confirm that our popular Summer School will be running this August based at the University of Worcester. With lots of single rooms, everyone is welcome!

For 2022 we are hoping to return to making use of a hired minibus driven by our own Colin Schofield. However, if you wish to use your own car you are welcome to do so. For the time being, we are keeping things simple and, aside from a trip to Ireland, will not be running any overseas trips. These will hopefully resume in 2023.

*Advance announcement - watch out for the return of our ever popular trips to Iceland for the early part of 2023!***NEW! North Cornwall, April 2-9**
This trip, which is based at the Cliff Hotel in Bude, takes in the varied geology and fabulous scenery of North Cornwall. Rocks of Devonian and Carboniferous age have been superbly folded and faulted in the Variscan Orogeny. We'll be taking in places such as the Delabole Slate Quarry, Tintagel and the amazing cliffs of Hartland Quay. Add in some of the granite around the north of Dartmoor and we have a great trip in store for you.

Raasay & Skye April 21-28
The island of Raasay is situated just off Skye and is a geologists' paradise with rocks ranging from the Lewisian to the Tertiary with Torridonian, and fossiliferous Triassic and Jurassic rocks in between. All this on an island that's 4 miles across and 11 miles long. We also spend two full days on Skye in what will be a truly memorable trip. *(Very few remaining places available.)*

Northwest Highlands of Scotland April 29-May 6
Based at the famous Inchnadamph Hotel in Assynt, this trip takes in some of the UK's finest geological sites in the Moine Thrust and other classic places. We journey to the 'multi-coloured rock stop', Smoo Cave and beautiful Achmelvich on the coast. See our oldest rocks and get to grips with the processes that were in place nearly 3 billion years ago. *(Few places remaining on this trip.)*

Dingle Peninsula, Ireland May 18-25
The west coast of Ireland is amongst the most beautiful in the whole of the British Isles and we want to share it with you! See amazing folds in the rocks of the Lower Palaeozoic and also a great variety of

different rocks, minerals and fossils. For this trip, flights to and from Cork are recommended. *(Very few places remaining.)*

Mull & Ardnamurchan June 4-11
This trip is based in the beautiful Mull village of Tobermory. We will spend much of the week studying the rocks of Mull, including taking in a trip to the island of Staffa (weather permitting). We'll also spend two full days on the Ardnamurchan Peninsula where we will be able to see Jurassic sediments with fossils, along with excellent igneous rocks from the Tertiary. Back on Mull we'll also take in the rocks of Iona and places like Calgary and Dervaig. This promises to be a great trip, full of varied geology and scenery. All this and a comfortable, modern hotel, who could ask for more!

Pembrokeshire June 25-July2
We've been trying to return to this, one of our favourite areas, for two years! This trip is based at the Premier Inn in Haverfordwest enabling us to travel to all the best sites in Pembrokeshire, and allowing you to travel by train to the field area. We'll be taking geological sites at Marloes, St Davids, Broadhaven and Saundersfoot, to name but a few. This is Palaeozoic geology at its best, all folded and faulted in the Variscan Orogeny. *(Few places remaining on this trip.)*

Northeast Scotland July 20-27
This trip examines the coastline of Moray and Nairn, along with some of the inland outcrops. It's known to geologists as the 'kingdom of Dalradia' because its dominated by the metamorphic rocks of the Dalradian formation. That said, we'll also see sediments from the Old and New Red Sandstones and even a little Jurassic. Come and explore an area of Scotland that lies between Inverness and Peterhead, we promise that you will not be disappointed!

University of Worcester Summer School August 13-20
Our annual summer school is beginning to feel a bit like the Tokyo Olympics! We first tried to run it in 2020 and then the University could not accommodate us this year, so we've gone for 2022! We are sure that it will have been worth the wait as we bring you a varied programme of field visits across the Midlands and Welsh Borders, from our bases in Worcester. Accommodation at the University is mainly in en-suite single rooms. *(We have a number of bookings already in place, but can accommodate more.)*

Berwick & the Borders September 1-8
This trip includes a visit to the 'holy grail of geological time' at Siccar Point and lots of other amazing places. From our base at the comfortable Castle Hotel, we'll be taking in both coastal and inland locations from Northumberland and Berwickshire. Marvel at folded Carboniferous sediments at Scremerston, the granite scenery of Cheviot and volcanics at St Abbs. In short, there's something for everyone on this week..

Lundy Island, home to the eponymous Tertiary granite

Minehead, Somerset September 14-21
The coast of North Somerset is the 'other' Jurassic Coast with similar geology to that of Dorset, but without the crowds! We'll be taking in the Devonian rocks of Lynmouth and the landscape of the Exmoor National Park. Weather permitting, we'll also take a day trip to the fabulous Island of Lundy in the Bristol Channel where you can examine a Tertiary granite.

Malvern Hills September 28-October 2
Great Malvern is world famous for its spring water that flows from fissures in the Precambrian rock of the hills made famous by Elgar. Aside from these ancient igneous rocks there are also nearby exposures of Lower Palaeozoic limestones along with sediments from the Carboniferous and Permo-Trias. We'll also be including a trip along the Severn Valley railway to view Coal Measures and dunes.

Chalk cliffs and raised beach caves at Flamborough Head

The Yorkshire Coast October 10-15
This trip is based at the small North Yorkshire village of Hunmanby, just to the south of Filey. From our comfortable guest house base, we'll get to see Jurassic and Cretaceous rocks from Scarborough down to Flamborough. We'll also take in the fine Quaternary cliffs of Holderness and the unique inland scenery that is the Yorkshire Wolds. A great way to round off the 2022 field season!

You can view brochures for all of our trips at our website: www.geosupplies.co.uk

Booking forms are only available from us at: downtoearth@geosupplies.co.uk. or ring us on 0114 245 5746

Don't worry, we don't bite!

All our educational classes and courses are friendly, informal and open to all.

Come and join us!
If you have any questions - please ask us.

Day Trips...

We're currently working on a short programme of Day Trips commencing in May and running through to September/October.

These will cost £10.00 per person. Full details will appear in the March issue of our online publication Down to Earth extra. If you don't currently receive it, you can get it FREE - just send us your email address.

Welcome to our virtual world!
Virtual Day Schools

Our popular Day School format, transcribed into a virtual format, with some lively topics for you to enjoy! Individual day schools cost £20.00 each. Printed background papers cost an additional £5.00 per day school. Day schools begin at 10.30 and involve three Zoom sessions of about 45 minutes each with time for you to carry out your own guided study in between.

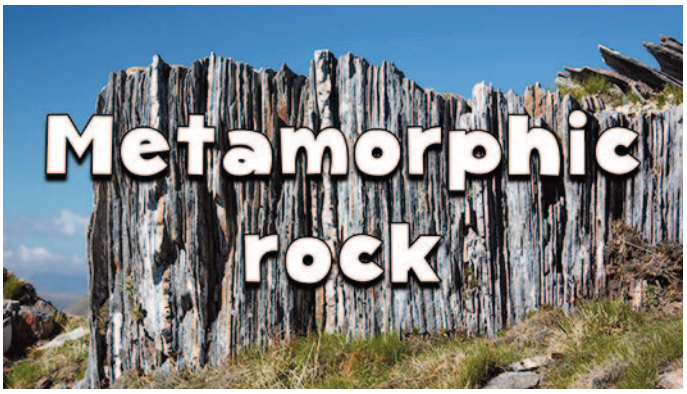
Our Virtual Day Schools cost £20.00 each or £25.00 if you want the background materials in printed form.

You can book online at: www.geosupplies.co.uk
or ring us on 0114 245 5746

February 9 Silicate minerals make rocks
Next to Carbon, Silicon is able to make the most chemical compounds, so it's no coincidence that Silicon forms the basis of most rock forming minerals and also artificial intelligence. This day will take the lid off silicates and explore how they define not only igneous rocks, but also metamorphics and sedimentary types. Don't let a bit of basic chemistry frighten you!

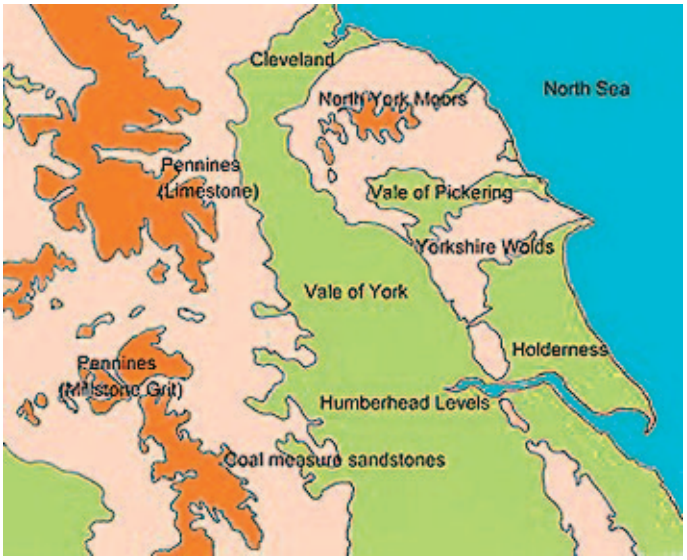
February 16 Metamorphism & metamorphic rocks
Of the three classes of rocks, metamorphics are the least understood. In this day school we'll debunk these rocks and show how to understand and appreciate them. By the end of the day we hope that you not only know more about them, but also that metamorphic rocks will be your favourites!

March 2 Black Diamonds the coalfields of the UK
During the nineteenth and the first half of the twentieth centuries, the UK was one of the world's largest producers of coal. We exported it around the globe from numerous places around our coastline. In this day we'll be exploring how that coal formed, and where and how it was mined. Today we view coal as an evil substance that has been a major contributor to global warming, but back in the day it was seen as a saviour to industrial prosperity.



March 16 The geology & landscape of Yorkshire
Yorkshire is a large county with a geology that stretches back to the Silurian and along the way includes rocks from the Carboniferous, Permian, Triassic, Jurassic, Cretaceous, Tertiary and Quaternary. Come with us on this rich and varied journey through the geology of 'God's own county'!

March 30 Torridonian, Old Red & New Red - the continental sandstones of the UK
Through the long geological history of the UK, there have only ever been three really important and thick continental sandstones, the Torridonian, the Old Red Sandstone of the Devonian and the New Red Sandstone of the Permian and Triassic. In this unusual day school we'll take a look at each of these formations. We'll examine their shared characteristics and the environments in which they formed.



Our Virtual Day Schools cost £20.00 each or £25.00 if you want the background materials in printed form.

To enrol onto these courses, or to find out more, go to our website, and enter the online shop: www.geosupplies.co.uk or ring us on 0114 245 5746

Autumn Zoom Courses

We realise that it's a bit early, but we are planning our Autumn Zoom courses to begin in October of this year, much like they did last year.
We'll keep you posted!

GEO Featured books for February 2022

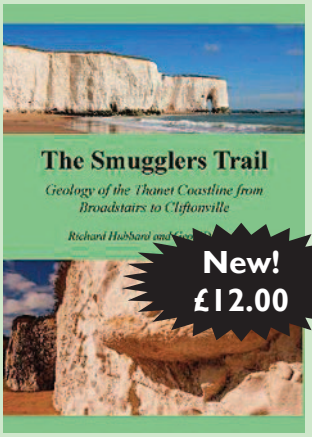
In each issue we are pleased to be able to introduce you to a range of featured books. Where they are being offered at reduced prices, these will be current to the end of February 2022 provided that stocks are available. Please note, all prices include UK postage.

New £18.00

Just out! £20.00

New £18.00

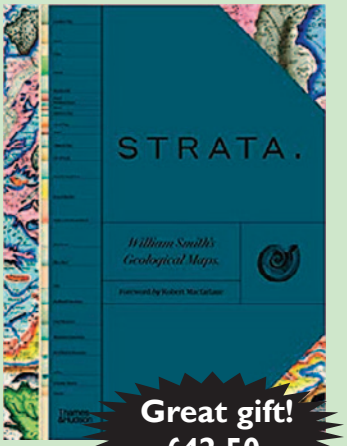
New! £19.00



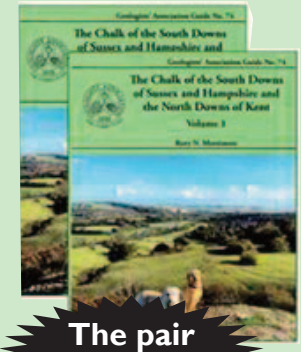
New! £12.00

New! £11.50

New! £25.00



Great gift! £42.50



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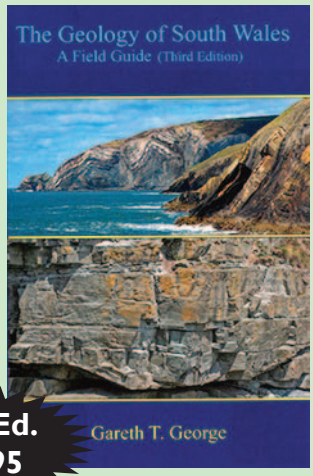

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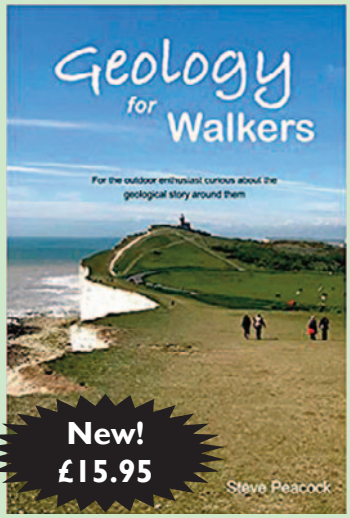

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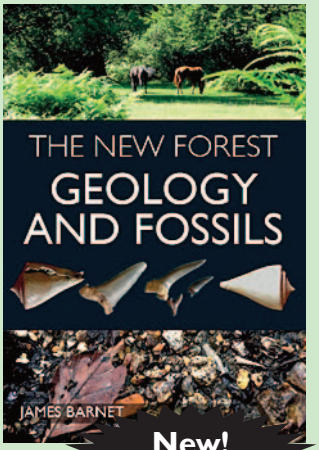

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