Rotunda Geology Group

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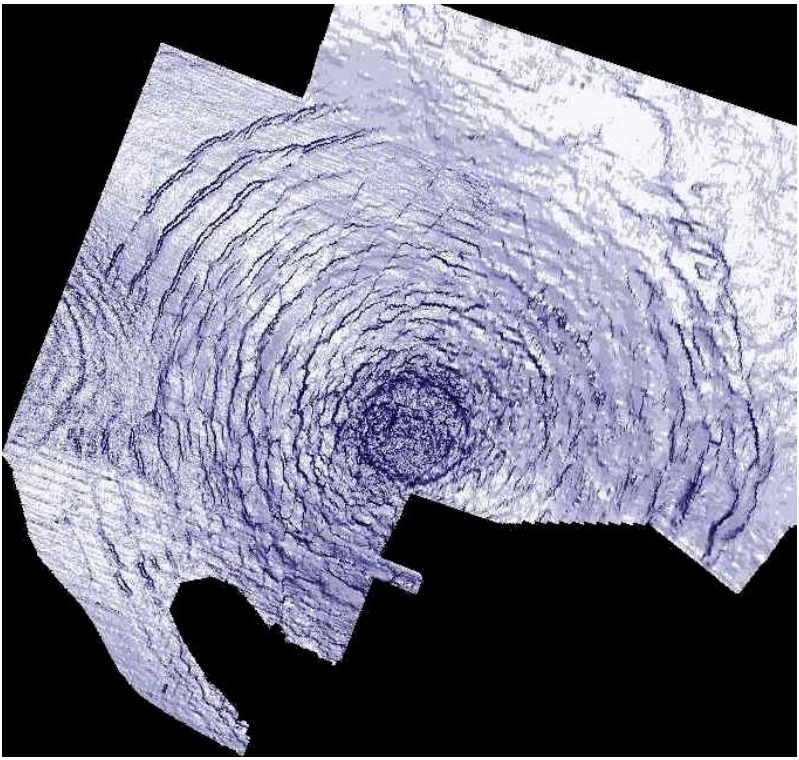
Magazine & Record 2025



Front cover photo – Silver Pit Crater seismic image (Google Images)

Editor's note

Welcome to the Rotunda Geology Group's magazine and record for 2025. Our programme of talks this year had something for everyone, varying between seaweed evolution and a biography of a little known geologist from a hundred years ago . Field trips ventured as far as Spurn point, our first joint venture with the Yorkshire Geology Society. Our thanks go Liam Herringshaw, our programme secretary for his thought and effort arranging all these activities. In addition to our now routine support of fossil handling sessions at the Rotunda museum, we also presented to the public at the Yorkshire Geology Day in Wakefield and the local Dalbyology event run by Foerstry England. Thanks to all those members who have contributed in any way but particularly Dan Normandale and Steve Livera for writing much of the content of this magazine.

Howard Watson

Rotunda Geology Group Committee 2025

Chair & Vice chair	Vacant
Treasurer & Secretary	John Hodgson treasurer@scarboroughrgg.uk secretary@scarboroughrgg.uk
Programme Secretary	Dr Liam Herringshaw programme@scarboroughrgg.uk
Editor, Magazine and Record	Howard Watson
IT Manager	Richard Dewhurst
Members without portfolio	Dr Tim Burnhill Dr Steve Livera Dr Sara Metcalf Dan Normandale Stuart Swann

List of RGG Meetings and field excursions 2025

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Abstracts of talks

March 6th
Mysteries of the Scandinavian Erratics

Ian Warrington (Huddersfield Geology Group)

Ian set out to look at the pebbles and glacial till exposures on our coast from a different perspective. Our geological texts use terms like a Scottish or Scandinavian influence when describing some of our tills but what does that mean? We have a good variety of Scandinavian pebbles on the North East Coast but apart from a few exceptions they don't appear to have been plotted back to a possible source. Do we know how and when they appeared on our coast?

April 3rd
The Importance of Seaweed - Geology & Phycology

Dr Jane Pottas (Whitby Naturalists Club)

Jane talked about the evolution of the algae and their place on the Tree of Life. *Bangiomorpha pubescens* was described in the year 2000 as a red alga representing the first occurrence of complex multicellularity in the fossil record. More recent discoveries in China have found fossil evidence of green and brown algae. The subtitle of Jane's talk was "How To Enthuse Geologists With Things That Are Only A Billion Years Old" and she certainly achieved that with a tour of seaweeds around Britian and the importance of our part of the North Sea coast in maintaining that biodiversity.

October 2nd
The Dinosaur Coast Re-imagined

James McKay (University of Leeds)

With an emphasis on the Jurassic, Cretaceous and Pleistocene of Yorkshire, James illustrated his talk with his fabulous artwork of past life. He described, in preparing for his illustrations, how he painstakingly researches and models ideas, then modifies his modelling following feedback from experts in their fields. It is understandable that illustrators of popular science often make dinosaurs the star of the show. However, it was refreshing to see the broader detail, in his seabed illustrations for example, set within the changing environments across the Toarcian oceanic anoxic event, of how even the more lowly ichnotaxa get due consideration and attention.

"Yorkshire's Amazing Dinosaur Coast", a book illustrated by James with words by Roger Osborne, is available in the Rotunda Museum shop.

November 6th

“Agnes Neilson: pioneer of geology”

Dr Katie Strang (Hunterian Museum, University of Glasgow)

Agnes Thomson Neilson MA was the first female employee in the Department of Geology at the University of Glasgow but her contributions to the university have been unsung, until now. Her obituary, written by a senior academic in the department, described “a brilliant and beloved teacher”. Further investigation of her life and career has been hampered by the fact that, unlike her male contempories, the department held no file on her. Katie and her team were able to find her name on many of the mineral specimens in the museum collection, and it is now evident she was heavily involved in fieldwork and minerology lab. teaching in the early part of the 20th century. By chance, a photograph of her has been found in the effects of one of her colleagues and, armed with this image, it is hoped that further evidence of her contribution to the work of the department will be found.

December 4th

Four short talks from members

Sue Hooper – discussed the seismic findings beneath the bed of the North Sea which have been interpreted by some as an impact crater from the Eocene (see front cover). This will be the subject of a full evening's talk by Dr Uisdean Nicholson (Heriot Watt University) in November 2026.

Sara Metcalf – spoke about her travels in Tubingen, where she worked as a graduate student and returned for a summer holiday this year. The main focus was the superbly displayed fossils of the University's Natiural History Museum.

Dan Normandale -.gave a precis of his talk "Building Stones of NE Yorkshire" for the Yorkshire Geology day earlier this year, which is described later (see page 29)

Stuart Swann - Tracking Oxfordshire's Dinosaurs. Early last year Dinosaur footprints were discovered in Oxfordshire near the village of Ardley. Just over twenty years ago Stuart visited a dinosaur footprint site in the same area, Ardley quarry, before it was filled.

The reports of this latest larger collection of footprints didn't mention Ardley Quarry (top in the picture overleaf), which is only a few hundred yards away.

Are they parts of the same track? (see over)

Satellite view of the two sites, the first site seen by Stuart in red (image by Google Earth, SS)

(publicly available image from SS)

Reports of Field Trips

Rosedale West and Fryupdale Head

Sunday June 22nd 2025

Leader: Steve Livera

The group met at the base of Rosedale Chimney Bank but, in view of the weather forecast, the planned itinerary was flipped and we drove to the car park at NZ 698 012 and walked towards Fryupdale.

We took the Trough House footpath to Fryupdale Head, stopping on the way to examine a coal pit shaft, one of several in the vicinity, marked by shallow humps in the topography.

The coal was worked in the 1800's for use locally, mostly to burn limestone for agricultural lime. The coming of the railways marked the end of the industry as coal was cheaper to import from the NE coalfields.

Margin of a shaft near Trough House. These shafts are now flooded and are several 10's of metres deep. (HW)

We discussed how the coal was won, by the use of mining adits (rather than 'bell pits' with lifting by pony gins from central shafts. The problem of unstable mine roofs meant that the adit lengths were limited, leading to the multiple patchwork arrangement of the shafts and their waste mounds. The heads of many of the moorland dales are marked by irregular disturbed ground, some areas relating to mining and some to large scale ground failure.

At Fryupdale Head we discussed the geological bedrock and gained an overview of the failed ground in the valley below. The view was excellent to the north and east before heavy rain moved in.

View of Fryupdale, the steep sides are formed by the harder Ravenscar Group sediments, the Whitby Mudstone Formation and older sediments for the valley floor. Ice advanced about halfway up the valley during the last ice age and a thin end moraine has been mapped by the BGS. (HW)

At first glance the topography appears mining-related but detailed study has shown this to be slipped ground. The area on the southwestern end of the valley was mapped in detail by BGS.

The failed ground was attributed to ice retreat at the end of the last ice age. Ice melting led to the drainage of a potential ice-dammed lake in Fryupdale and high pore water pressures in the over steepened Whitby Mudstone slopes both of which led to multiple rotational slope failure blocks.

Southwestern end of Fryupdale Head showing the land slipped blocks of Ravenscar Group sediments. The failure surfaces were in the underlying Whitby Mudstone Formation. The scar in the background is formed from the Eller Beck Formation (as seen in Whitby Harbour), and the rotated blocks are capped by the same. (HW)

Next, we visited the spring 50 m to the east (which is in the Eller Beck Formation), walking across heather moorland. This spectacular chalybeate spring deposits bright orange ochre that scars the hillside to the valley bottom below. The ochre is spongy, and forms as a colloidal like mass from the chemical deposition of hydrous iron compounds, the iron being sourced and produced from organic decay in the acidic moorland aquifers and then deposited as the mineral water degasses on emergence at the spring.

George Gap chalybeate spring. The bright orange ochre is the result of iron deposition from the spring water, aided by CO2 degassing and microbial action. (HW)

Returning to Rosedale West, we walked along a rough track to the base of the Garbutt's and Hitching's deposits. Along the way we discussed some of the main mining features illuminated on Lidar and found samples of the magnetic ore.

The line of a tramway, used to take ore up the valley side to reach the main railway system on Blakey Ridge, could be picked out, with spoil heaps at the side of it.

Line of the old tramway from the 1860's used to transport the iron ore up to the kilns and railway sidings above chimney bank, Rosedale West. The mounds on the right relate to later extraction of the 'top seam' Dogger Formation ore which is not magnetic.

At the mines we looked at the geometry of the two deep gulley-like Toarcian Rosedale Ironstone deposits using LIDAR to guide us and searched for features that can explain their formation. The outcrop has degenerated considerably and there is little evidence of how such a deposit formed, although a few theories were discussed.

Unpublished mineralogical data from Tony Kearsley helped us to understand the lithology of the ore and its diagenesis. This is a very unusual deposit and chemically difficult to explain based on modern known analogues. The dominant iron mineral is siderite, but significant portions of magnetite series give it a magnetic property. Subordinate chamosite is also common in the rock, initially deposited as iron ooids. The Top Seam (Aalenian Dogger Formation) was inspected on the north side of the Garbutt deposit; this is a poor ore (ca.25% iron) compared to the underlying magnetic ores (ca. 50% iron). A final problem (there are many here) is how the 20m thick ore was completely extracted without removing the Saltwick Formation overburden. It is thought that a method known as Top Slicing was used to take successive layers of ore out, bracing the roof with timbers before removing the layer below. Eventually the whole roof subsided leaving the marked hollows in the landscape that are picked out well by the Lidar and define the limits of the two geographically very restricted ore bodies at Garbutt's and Kitching's.

Spurn Point and Dimlington Cliffs, Holderness Coast

Dune system geomorphology and Quaternary Till deposits

Saturday 26th July 2025

Leaders Mark Bateman and Dan Normandale

(Joint with Yorkshire Geological Society)

With an impressive turnout of 25, the first ever joint YGS and Rotunda Geology Group (Scarborough) outdoor meeting began in dry and overcast conditions at the YWT (Yorkshire Wildlife Trust) Spurn Discovery Centre.

The group gathered on the southernmost extent of the Holderness glacial till cliffs at Spurn. Photo: Dan Normandale

Part 1 of the trip took us from the southernmost tip of the eroding Holderness glacial till cliffs, where the Spurn spit connects to the mainland, across the 400 metre long location of the 2013 storm breach and up onto to the long established

dune system, which then extends to Spurn's head where the North Sea and the Humber estuary meet.

Discussion centred around four main topics:

1. That Spurn is more stable geomorphologically than previously understood, based on recent University of Sheffield research, which using luminescence dating techniques showed the dunes to have persisted for up to 400-600 years in the same locations. Previous ideas suggested that every 250 years the entire spit is cyclically destroyed and rebuilt, migrating ever westwards, which again, new research shows, is actually more of a southward's extension of the head over the last 200 years.

2. The greatest challenges to Spurn's longevity have been short-lived partial or complete breaches, in the narrowest neck area. Whereas historically, humans have intervened to repair the damage, the latest occurrence in 2013 has been left to nature. A time series of LiDAR surface model images were shown to illustrate how sediments have accreted again to close the breach, and how embryonic dunes are beginning to form.

3. The lost medieval town of Ravenser Odd, surely the most evocative example of the dynamism of Spurn's geomorphological setting, which was washed away in the 14th century, it's exact location on Spurn unknown to this day, despite media reports to the contrary,

4. Spurn's criticality to ameliorating the impacts from North Sea storms on the Humber estuary and how, using remote sensing and a newly deployed wave buoy off Spurn, national and local government are constantly monitoring conditions and spatiotemporal change.

Lunch was taken in the outdoor amphitheatre picnic area of the Discovery centre before Part 2 commenced on Dimlington Beach, just north of Easington Gas terminal.

Mark introducing Part 2 of the meeting at Dimlington Cliffs. Photo: Dan Normandale.

Here the towering, crumbling glacial till cliffs have been the subject of much fieldwork logging and interpretation, from Lamplugh then Reid in the 1880s, Bisat in the 1930s and Lewis Penny and John Catt in the 1950s-60s. In the 1980s, after a proposition from James Rose at Birkbeck College, the location was established as the Type site for the last glacial episode in Britain, henceforth the 'Dimlington Stadial' (26-13ka).

Mark talked us through the chronology of the Basement, Skipsea and Withernsea Tills, all deposited between 25,000-20,000 years ago, contemporaneous with the advance of the British and Irish Icesheet, southward down the North Sea basin before terminating on the present-day Norfolk coast. The Skipsea Till is associated with the maximum limits of the Dimlington Stadial Ice in Holderness, and the Withernsea Till as a subsequent oscillation deposited by the same icesheet as it retreated northward. We were treated to a rare glimpse of the Basement Till, which is often buried below the beach deposits, but the relentless erosion of the cliff line, part of the fastest eroding coastline in Europe, means every site visit holds surprises! Particularly evident on this occasion were chalk stringers, some several metres long, and with the consistency of pliable putty filler, courtesy of the glacial pulverising the underlying Cretaceous Chalk has suffered. As at Spurn, the beach is bejewelled with an array of sedimentary, igneous and metamorphic erratics, with the addition of fields of armoured mud boulders.

Example of the chalk stringers in the Skipsea Till, Dimlington Cliffs. Photo: Colin Waters

Further reading

Bateman, M.D., McHale, K., Bayntun, H.J., Williams N., (2020) Understanding Historical Coastal Spit Evolution: a Case Study from Spurn, East Yorkshire, UK. *Earth Surface Landforms and Processes* 45, 3670-3686.

Bateman M.D., Davies E., Evans, D.J.A., Roberts, D.H., Connell, E.R., Rhodes, E.J., (2025) Developing a new approach to the luminescence dating of sediments from glacial contexts. *Quaternary Geochronology* 87, 101659.

Environment Agency (2025) https://engageenvironmentagency.uk.engagementhq.com/h

umber-2100/news_feed/birthday-buoy-celebrating-one-year-of-the-spurn-wave-buoy-deployment

Lee M., Pethick J., (2018) 'Spurn: Geomorphological Assessment'. Natural England Commissioned Reports. No. 255. https://publications.naturalengland.org.uk/publication/4872627864993792

Rose J., (1985) The Dimlington Stadial/Dimlington Chronozone: a proposal for naming the main glacial episode of the Late Devensian in Britain. *Boreas* 14, 225-230.

Goodmanham Dale, East Riding

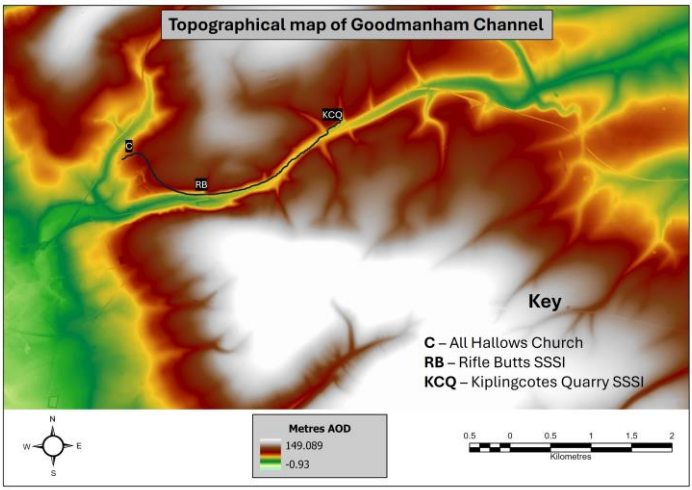
Sunday 17 August Saturday 16th or Sunday 17th August

On a cloudy but dry Sunday in mid-August, RGG made their second foray into the East Riding, three weeks after visiting Spurn and Dimlington on the coast. Over 20 attendees gathered in the village car park in Goodmanham, near Market Weighton, on the western escarpment of the Yorkshire Wolds.

The first stop took in the Church of All Hallows, to investigate the building stones, primarily Jurassic limestones (Cave Oolite) and sandstones (Aislaby). The church was established during the Anglo-Saxon Age, reputedly on an earlier pagan temple, and according to the Venerable Bede, is the location of Edwin King of Northumbria's conversion to Christianity. The standing building dates to several phases of rebuilding and expansion in the 12th to 14th centuries. The church interior with its mix of beautifully crafted medieval stonework and Victorian stained glass windows captivated the group to such an extent we were already behind schedule!

Internal arch of All Hallows Goodmanham (photo HW)

From the village we descended into Goodmanham Dale, originally a Quaternary outwash channel carved through the Wolds by meltwater flows from the British-Irish Ice Sheet sat astride the Holderness Plain in the east, stretching to the shores of glacial Lake Humber in the west. The Goodmanham Channel, to give the feature its Quaternary moniker is now a dry flat-bottomed valley, perfect for the infamous George Hudson to build the York to Beverley railway line, which operated between 1847 and 1965 and is now a well-used walking trail. Incidentally, the Channel was previously known as the Market Weighton spillway, but this title now belongs to the giant concrete structure on the edge of said town's flood relief reservoir!



(Image: DN)

On reaching the base of the Dale, we stopped at Rifle Butts SSSI (Site of Special Scientific Interest), which is often questionably described as a quarry, but undoubtably was a rifle range in the 19th and 20th centuries. David Craven, representing the landowners, Yorkshire Wildlife Trust, awaited our arrival. David, a self-confessed lapsed geologist, is Regional Manager East for YWT, and had volunteered his time, at Liam's request, to tell us more about the site's ecological value, including characteristic chalk plants like cowslip, marjoram, field scabious and wild basil and breeding birds such as willow warbler and yellowhammer.

Geologically, Rifle Butts harbours a nationally important exposure of a Cretaceous-Jurassic unconformity.

Liam Herringshaw describes the sequence at Rifle Butts (DN)

Protected from rain and weathering under a roofed structure and maintained by volunteers from Hull Geological Society, the exposure consists, from bottom to top, of Jurassic (Toarcian Age 184-174 Ma - Million years ago) mudstone, overlain unconformably by Cretaceous Red Chalk (Albian Age 113-100 Ma) then Lower Cenomanian (100-93 Ma) massive and rubbly grey chalks with marl bands. Therefore, several tens of millions of years, and an estimated kilometre thick of deposits are missing, or eroded away – indirect evidence for the Market Weighton High keeping this area above sea level.

The group moved onwards east further into the Goodmanham Channel, with the intention to make a stop at a small chalk exposure near the Wolds Way footpath, which crosses the dale. However, this location is now inaccessible due to recently-installed and expensive looking barbed wire fencing that hems in the Wolds Way path alongside a field perimeter. Consequently, we proceeded to the final stop, Kiplingcotes Pit.

Fossil hunters at work, Kiplingcotes SSSI (photo HW)

Kipingcotes is another SSSI and YWT Nature Reserve. This bona fide quarry provided chalk for the building of the adjacent railway until 1902. It now provides rare chalk grassland habitat and geological exposures of Welton

Formation chalk, draped with extensive scree slopes boasting fossil bivalves, brachiopods and echinoids. The search for these avidly occupied the group until it was time to slog back out of the dale to Goodmanham, many seeking liquid refreshments at the village pub before heading home.

Forge Valley & Wykeham

Saturday 6th September

A group met for a 4-mile circular walk exploring the landscape, archaeology and geology of Forge Valley. In the afternoon they moved on to Wykeham Lakes for an "erratic" tour, based around the RGG's display of erratic pebbles found there (see our magazine from 2024 for the story of this display).

RGG at the Yorkshire Geology Day 2025

The RGG stand at Yorks Geology day (DN)

For the second year running, the RGG was invited by Yorkshire Geol Soc to provide a stall at the National Coal Mining Museum, near Wakefield. Given the relatively fewer exhibitors this year, our offering took on further prominence, showcasing a fabulous array of dinosaur prints, fossil plants, model horseshoe crab, interactive digital photo guide to the dino prints and various display boards. All proved immensely popular with the over 1100 visitors on the day, a record for this now well-established flagship event.

This year's theme was 'The Rocks that built Yorkshire' celebrating the county's building stones through a series of short talks in the afternoon. Dan Normandale duly delivered a run through of how, when and where Jurassic sandstones and limestones have been used since Roman times, with a nod to lesser known materials from the 'Hebridean intruder', the Armathwaite-Cleveland Dyke to the Quaternary cobbles from the Holderness beaches.

RGG's very own Programme Secretary, Liam Herringshaw, followed up with an entertaining and enlightening summary of York's building stones.
Many thanks are extended to the crack team of RGG exhibitors – John Hodgson, Dan Normandale, Steve Livera and Tim Burnhill.

Rotunda Geology Group Outreach 2025

In addition to the Yorkshire Geology Day, it was another year when our ever-enthusiastic volunteers promoted geology at Dalby Forest and the Rotunda Museum.

I have a list of the names of our 15 regular volunteers, and by some miraculous happening, when I email dates and ask, immediately I have a band of helpers to put on our four - table events in the Rotunda 10 times a year in school holidays. Amazing!

Spring school half term in February sets us off, and fossil handling Tuesdays are booked into the (now North Yorkshire County Council run) Rotunda Museum event planning, through Easter 2 events, Summer half term 1, Summer 5 and Autumn 1.

As usual, we had a large number of visitors. The restricted space in the first floor "orientation" area becomes very congested, and so in 2026 we will be trying out spacing some tables in the Jurassic Seas gallery which Charlotte has approved.

We are told that the events attract an increase in visitors, which results in more revenue from entrance fees and from the shop. On 8th April we saw 22 children and 41 adults. The next week we saw a record-breaking 67 children, 80 adults and then 45 students from the University of Portsmouth. 192 must be our highest total yet. Other totals of 156,136 and 175 indicate that we do a lot of talking, and so the tea, coffee and biscuits provided by the Museum are very much appreciated, Thank you to the Museum staff who support us on our visits.

It's really rewarding, and brings geology alive in the Museum. If you are reading this and are interested in meeting hundreds of Rotunda visitors who want to see and learn about fossils (not just dinosaurs!) do volunteer. You do not have to have a geological background, come and see what we do for an hour or so – help with the trilobite jigsaws – help make the tea! You will be rewarded by the enthusiasm of the RGG team, the visitors, and the local people who are astounded to learn that they drive over an ancient coral reef on the way to East Ayton!

Pete, Mary, Josh and myself also attended Dalby Forest's Dalbyology Day, which celebrates all nature and wildlife "ologies". We were indoors this year as the weather was considered too wet and windy to use the marquee. The forecast affected the attendance which was disappointing, but it was good to meet up with the other groups exhibiting - the composters, the Sea Life Centre, and the fungi, bird, butterfly and moth enthusiasts and the North York Moors Rangers as well as the Dalby Forest staff. Thank you to Carol Robinson who organizes the event for Dalby.