



# North Eastern Geological Society

## Newsletter July 2022

### UPCOMING EVENTS

**28th August: Garrigill – South Tyne.  
Karl Egeland-Eriksen**

**25th September: Howick – led by  
Chris Savill (Durham University)**

**Please contact Gordon if you wish to  
attend [gordon.liddle@hotmail.co.uk](mailto:gordon.liddle@hotmail.co.uk)**

### FIELD TRIP / LECTURE REPORTS

**22.5.22 Field Trip, Chopwell Woods -  
with Derek Teasdale**

A large party gathered in the idyllic  
Chopwell Woods to meet with Derek.

The plan was to examine the substantial  
Chopwell Esker, famous for its size and  
characteristics. Derek added additional  
opportunities with a novel tufa deposit,  
impressive fluvial features and a mining  
heritage. The esker, initially, had an  
asymmetric section with a 10m bank on one  
side, 15m on the other. It was 15m wide  
with an undulating surface. Exposures  
clearly demonstrated a sandy matrix  
holding very coarse rounded material,  
essentially local Carboniferous material.

The scale? It runs for at least 2 km., with  
chaotic mounds in the adjacent Beda-  
Strother hills which may be associated with  
the fluvio-glacial glacial deposition process.

Derek outlined the origin, he favours a 1  
km thick ice sheet decaying rapidly with a  
basal stream which in summer carried the  
bed load, finer material being carried away.  
The bed load created the esker structure  
together with other similar deposits in the  
area. This feature is important as it has  
survived post glacial erosion processes very  
well. Today a pine tree plantation obscures  
the scale a little but also protects the esker  
and enhances the environment, much  
enjoyed by a network of public tracks. The  
recent destructive wind uprooted a few  
trees revealing in their root plates a good  
view of the sediment.

We moved onto the valley of the Pallis  
Burn. Initially a dry valley, this parallels the  
esker, not an unusual relationship. In the  
heavy vegetation we noted the location of  
nineteenth century drift coal mines on the  
valley sides. (Drift mining avoids the  
construction of shafts and allows natural  
drainage to keep the workings dry.) These  
had been worked between 1870 and 1962  
for excellent coking coals. Known as the  
Victoria- Garefield drifts the closeness  
suggested seam splitting or possibly two  
seams in the area. The actual mines were  
known as the Coronation Drift and the  
Speculation Drift. (Discussion took place on  
the significance of these names) a coke  
works had been built to the east (later

replaced by a very large plant lower down the Derwent Valley.)

Rails indicated a level of mechanisation. A large bridge- tunnel structure for moving the coal has been well constructed, now blocked for safety reasons. Multiple drifts were noted together with small exposures of coal shales. Some are unnamed in the local records.

Further down the valley the stream was now clearly established, the mine drainage no doubt enhanced the discharge. Mounds of tailings present some confused deposits. Of considerable importance were multiple (8-9) 'leets' in this area; a classic structure has developed to create a very fragile sedimentary environment. Essentially a series of small dams have been created by the deposition of calcium carbonate. This deposition (Tufa), in part, has a biological origin, the deposition could be linked to mine drainage effects, water percolation through the sand and gravels or even a thermal circulation linked to the granitic cupola that underlies this area- part of the granitic pluton that underpins the Alston block. The dams entrap organic materials and even polluting materials.

Moving down stream we came onto the remains of a paper making site: Lintzford Mill. There were the remains of small reservoirs, water settling structures and a variety of features required by the

manufacturing process. Clearly this whole area has been a significant industrial setting.

We moved onto the waterfall confluence with the Derwent, a broad river at this location with a very coarse bed load. The controls on the Pallis Burn may have limited its down cutting powers or the stream may have had an erratic discharge together with the presence of a substantial sandstone bed creating the waterfall. We moved up the Derwent to a deep gorge structure supported by thick sandstone beds formed by the huge Carboniferous river. Very scenic, the group admired the varied vegetative species occupying the environment and the rapid changes in the river width as rock strength exerted a control.

Our trip was completed by a very pleasant walk through the Chopwell Woods. The group were delighted to thank Derek for an excellent day, clearly explained.

Gordon Liddle / photos: Derek Teasdale

## **26.6.22 Field trip, Liddesdale**

### **Led by Gordon Liddle**

The June 2022 field visit was to Liddesdale, near Saughtree. Despite the remote location in the Southern Uplands there was an excellent turn out.

There were a variety of aims:

- to investigate the Palaeozoic, Mesozoic, and recent deposits in the area
- together with a challenge to investigate three contrasting stream valleys
- and the breaching of the Liddesdale- North Tyne watershed.

The day started well with the group considering a variety of field observations as they progressed towards the abandoned track of the North Tyne railway. A slope displaying the characteristics of a solifluction area was noted together with a variety of materials in a riverbed.

On reaching the rail track we headed west, quickly reaching an exposure of a weathered, vesicular olivine basalt. Gordon described this as an exposure of the Birranswark lavas. These are dated to the early Carboniferous although recent work has shown them to interdigitate with the underlying Old Red Sandstone material in nearby locations. A sharp, near vertical fault was described by group members, limiting the lava outcrop. Upper ORS material was noted with evidence of lacustrine aeolian and riverine processes. This exposure was limited at this site, but extensive outcrops occur in the area. The next stop allowed the group to examine intensively deformed slaty material with a sharp, angular unconformity allowing it to underpin the ORS material. This was

Hutton's Unconformity, a clear exposure, easily accessed (out of the lambing season) whereupon group members carefully examined the oldest rocks.



The tilting, folding, faulting and flute casts on the bedding surfaces etcetera agreed with many descriptions of the orogenically deformed Silurian material in this area. An extended discussion agreed with descriptions of this area being part of the Laurentian - Avalonian contact in the Caledonian orogenic event. A simple field measurement exercise allowed the degree of crustal compression to be discovered- it was huge with 100% and more noted.

The photograph below records the tight folding of the Silurian at one location.



Discussion of the significance of these three facies, was extensive and later supported by a graphic, on the web.

Following a lunch break Gordon formed the party into three teams to investigate the valleys of three streams crossing the solifluction slope. This work was group led. The outcome was most impressive with evidence of truly massive discharge in one, river capture in another and changes due to structural controls or rejuvenation in the third. Discussion was most encouraging.

A stop at the cut through of the Liddesdale watershed was the last of the day's observations. This is a recent change, allowing the transitional features to be noted.

The day was considered to have been highly successful, Gordon was warmly thanked. Gordon Liddle.

*Find out more about the geology of this area with the link below*

<https://www.youtube.com/watch?v=NiYnuUrji3U>

### **17.7.22 Field trip, SE Northumberland Coast led by Dr Ian Kille.**

#### **[Northumbrian Earth](#)**

Ian led a healthy group to examine and interpret the exposures in SE Northumbria. It proved to be an excellent day, very focussed on the evidence available and discussion of the implications for

environmental formation across four significant tectonic episodes.

We began at the land side of the River Tyne's north pier. An overview of the cliff material revealed dipping Carboniferous material, this had thick sandstone layers displaying possible fluvial structures interbedded with thin shales. An abrupt Unconformity (50 Ma time gap) gave way to Permian sandstone with dune bedding. Discussion agreed that the Carboniferous material represented a shallow coastal marine environment with episodes of deepening and shallowing.

This was deposited on continental Devonian material (not seen here) implying there had been an effective rise in sea level (or fall in land level). This marine phase clearly gave way to a period of uplift and erosion (research has indicated this phase lasted approximately fifty-nine million years) creating the Unconformity.

The yellow sandstone was a continental deposit indicating a fall in sea level. Much research on these conditions indicate it was an extensive continental desert- that subsequently experienced a marine breach that flooded an inland basin creating deposits in the Zechstein Sea.

The Carboniferous material is thought to have originated in the extended erosion of the Laurasian continental mass following the Caledonian Orogenic event (NEGS trip, last month, June 2022, saw evidence for

this event) Ian led the discussion to suggest this area could be explained by very extensive deltaic environments. The weight of the deltaic material would have supported the extensional (E to West) forces that were responsible for the deepening Northumberland trough. At this time, the Variscan Orogenic event was developing, contributing to the stress field. A very long period of erosion followed the Caledonian event helping to account for the complex of material with the stress field facilitating collection of that material.

In the Tertiary, constructive plate margin activity was affecting what is now the west coast of Scotland. Here at Tynemouth a tholeiite dyke intrusion strikes across the beach sourced from the magma body in the vicinity of Mull. The dyke displayed the classic features: igneous rock, polygonal cooling crack patterns, baked margins. The intrusion is thought to have averaged a speed of eighteen kms per hour, led by hot gases of course. This implies about four days to have travelled from Mull. The area has multiple vertical intrusions like this making the event a very significant one. So, Ian had introduced us to the post Caledonian Orogenic influences, Variscan effects - especially in terms of sea level fluctuations and basin development plus the Tertiary igneous effects.

We moved a short distance North into St Edwards Bay. An examination of the north facing cliff revealed the tilted Carboniferous

material with abundant current bedding, wash out features, much distortion and shale lenses. Above it lay the early Permian sands. High in the cliff a dark band was picked out as a marl slate: a fine-grained bedded material interpreted as forming in an anoxic environment. Ian used photo micrographs of local sandstones to demonstrate how the composition of the sandstone rocks varied in terms of maturity of texture and composition. This reflected the variety of sources, depositions environments and the physical environments affecting the sediment. Ian developed an interpretation of major river deltaic environments with inter distributary bays and sea level fluctuations to help explain the mix of environments responsible for the cliff section.

We moved a little over a mile north to the Cullercoats Bay area. Here the Carboniferous material displayed cyclothem characteristics. A seat earth was abundant with rootlet features, pale grey but no environmental structures, as a soil this is classic evidence. A dark shale lay above it with poor coals reflecting an ancient forest environment above it, iron concretions were noted, the tropical weathering having released iron from the original materials. The iron diagenetically precipitated to form bands and concretions. The sequence demonstrated the area was effectively sinking when formed, it was probably on the flanks of the developing Northumbrian basin. The Hutton coal seam appears next,

it is very helpful in interpreting the deformation of the rocks here.

An important structure was viewed next, the 90-fathom fault is exposed here (it guides much of the River Tyne); probably the surface manifestation of a major fault that underlaid the area well before any Caledonian activity. Early miners had calculated the vertical displacement of the Permian material to 90 fathoms (90x6=540') today that figure remains close to our technological estimate.



The fault surface was very clear, its dip measured to 35 degrees. Its trace could easily be followed out to the east. Ian showed the group excellent tree materials collected locally, roots, leaf like features, stems all related to giant lycopods.

The Permian sandstone was heavily veined by barium rich minerals, probably migrating along the fault. To the north of the fault the Permian sandstone is flexured by the movement of the fault. The synform developed here provides a favourite beach for people to enjoy. We noted the large-scale dune bedding and reverse dipping

caused by the sand berms being sinuous. Wider research has shown that seven of these berms formed in this area.

Moving a little way north into Browns Bay we enjoyed lunch whilst noting the massive sandstone layers indicative of a very large sand bar developed in the mouth of a river. This part of the coast appears to have several of these features. Ian again showed pictures of thin sections of the rocks, quartz rich in feldspars evident were noted.

We moved further north to St Mary's Island, another sand bar location. Some faulting was discussed, some amazing trace fossils were seen reflecting lifestyles we find today! The rock sequence here was Carboniferous with large iron concretions, many load cast features, coal seams confirming our geological presence in the Carboniferous.

We moved north to Collywell Bay. The area again has a similar rock assemblage to that viewed but here another large dyke was seen forming a 'book end' with the Tynemouth dyke. Features were noted with glee as the group had absorbed the similar features already seen.

The trip had been wonderful; members asked searching questions which Ian helped them to answer, the weather had been warm, dry, and largely wind free- an excellent day. Ian was given very warm thanks for the day. Gordon Liddle



*And you can read more about the geology of this area and see some of the diagrams I've used at [https://earthwise.bgs.ac.uk/index.php/Carboniferous and Permian rocks between Tynemouth and Seaton Sluice - an excursion](https://earthwise.bgs.ac.uk/index.php/Carboniferous_and_Permian_rocks_between_Tynemouth_and_Seaton_Sluice_-_an_excursion)*

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## **Dates for the winter series of lectures 2022-23**

The lectures this winter will be a combination of face-to-face events and online events on zoom.

**21st October** face-to-face

**18th November** online/zoom

**9<sup>th</sup> December** face-to-face

December's meeting will be a members' meeting where three member volunteers will offer twenty-minute presentations. If you wish to be one of these three presenters, please contact [Prof Gillian Foulger](#)

**20<sup>th</sup> January** online/zoom

**17<sup>th</sup> February** online/zoom

**17<sup>th</sup> March** face-to-face **AGM** and lecture

## **NEGS Subscription Year 22/23**

**(Judy Harrison – Treasurer)**

At the last AGM it was agreed that the date subscriptions are due would be changed to September to help administrability. It was also agreed that the subscription level would remain at the current rates.

Due to COVID 19 the committee agreed to waive subs for 2020. Members who had already paid for 20/21 had their subs carried over to 21/22.

Some members have not paid in either year and will be contacted separately.

22/23 subs will be due by the 30th of September. Payment can be made:

By Bank transfer – (preferred)

Title: N E G S (please leave a space between letters)

Sort Code                    09-01-51

Account Number        75189803

Please enter your full name as the reference

By cheque – please send to:

NEGS, c/o 28 St Ann's Quay

4 St Ann's Street,

Newcastle upon Tyne NE1 2DJ

Full Membership.	£20
Family Membership:	£30
(Persons residing at the same address)	
Unwaged or dependent on state pension (the society relies on the member to interpret this)	£10
Members unable to attend meetings.	£7
Full time students	Free

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In reviewing some of the decisions and changes made during the last 27 months it is considered that the **Constitution** of the society requires a review and possible rewriting to define the new post-Covid normal NEGS. To this end your committee are seeking a member volunteer (or more) to carry out this task. You will report back to the Committee in time for the revised Constitution to be presented to the membership at the AGM. You will, of course, be given any necessary support. Contact [neg1857sec@yahoo.com](mailto:neg1857sec@yahoo.com)

Contributions/observations welcome!  
contact the editor at  
[mcnultyjohnf@gmail.com](mailto:mcnultyjohnf@gmail.com)

**Finally**, sad tidings reach us this week with news of the death of member Geoff Taylor. Geoff was a retired solicitor and proud of his Liverpoolian origin. He was active in NEGS, had broad interests in third age education generally and a particular fondness for the history of the golden age of Northumbria, being involved, as a member of the Bernician Studies Group, in archaeological surveys (as shown below) and excavations here and in Donegal.



His wisdom and experience were evident in the calm and humour with which he managed the charitable status of the Bernician studies group. He will be much missed.