

Newsletter February 2019

UPCOMING EVENTS

15th February 2019

Dr Antonio Capponi, University of Durham
"Bubbles in basaltic volcanic systems:
insights from analogue experiments"

15th March 2019

Prof. Claire Horwell, University of Durham: "Volcanic hazards"

This is rather a bumper edition of the Newsletter full of Lecture reports from Les Barnes on the December meetings. Also, lots of dates for your diary.

LECTURE REPORTS

Members Evening Friday 14th December

Dr Andy Lane: Glimpses of Harz Geology; similarities and differences.

The Harz Mountains (in northern Germany), emerged because of the earth movement associated with the Hercynian Orogeny of the late Carboniferous (the alternative term Variscan Orogeny is perhaps more widely used today). Andy's recent visit took him on a field trip to a variety of significant exposures representing strata and tectonic movements covering the Devonian, Carboniferous and Permian periods. Andy's experience led him to make comparisons between the Harz geology and that of North East England. Whereas there were considerable similarities in the deposition of sedimentary rocks, the earth movements in the Harz were in considerable contrast to the

relative calm of North East England. In the Harz the closing of the Rheic Ocean resulted in the strata being squeezed due to subduction leading to violent earth movements and mineralization, folding and thrusting. As a result of these active plate tectonics during the Permian there were granite intrusions and acid volcanic eruptions, followed in the Upper Permian with the deposition of carbonates and evaporites like those we know in North East England. On the other hand, yellow sands were absent in the Harz. Some exposures in the Harz quarries are familiar to us, such as slumping effects, collapsed breccias etc. Andy showed us some fascinating photographs, including a Devonian reef limestone, ORS cross-bedding, lower carboniferous slates and turbidites,



LOWER CARBONIFEROUS SLATES
(NEAR OKER, EAST OF ZELLERFIELD)

and a fascinating example of stretching during folding, known as proto-boudinage (see over)



STRETCHING DURING FOLDING – PROTO-BOUDINAGE

The field trip then moved on to visit a mining museum at Rammelsberg just south of Goslar, which was an active quarry until the 1980s. This was the centre of mineralisation fed by deep-seated granites and has been actively quarried and/or mined since the Middle Ages. Lead ore, copper and zinc were mined along with associated silver (the story is repeated in Weardale). However, at Rammelsberg the ore body was formed from thermal springs on the sea-floor (known as “black smokers”), in the late Devonian. The site is well preserved following closure and is clearly well worth a visit.



Au and Ag BEARING Pb, Zn, and Cu ORE PRODUCTION

A NEGS field event, perhaps?

LRB

Chris Taylor: Late Carboniferous and Early Permian volcanism in East Fife

During this time, towards the end of the Variscan Orogeny, extension in East Fife resulted in a series of fault-controlled basins. The area was intercontinental, having large river basin, deltaic and lacustrine conditions. When mafic magmas, produced from melting caused by the release of tension below, erupted into this watery environment, the combination of water and very hot magma resulted in violent phreatomagmatic eruptions. The remnants of over a hundred of these eruptions have been found in East Fife with particularly good exposures around the coastline between Lundin Links and St. Andrews.

The volcanoes are small diatremes, with geologically short-lived eruptions. For example, the eruption of Surtsey in 1963 was one such eruption (that some of you may remember) resulting in a small island of rocks fragments. In 1967, when eruptions ended the resultant island began to erode though it remains above sea level.

As a second example, the Eifel in Germany serves as an area where we can see other modern volcanoes of this type. There the vent is often filled by a lake known as a *maar* surrounded by a ring of tuff.

(See over)



Holzmaar, Eifel, Germany

From investigations elsewhere we know that underneath the maar is a cone shaped conduit (diagram below).

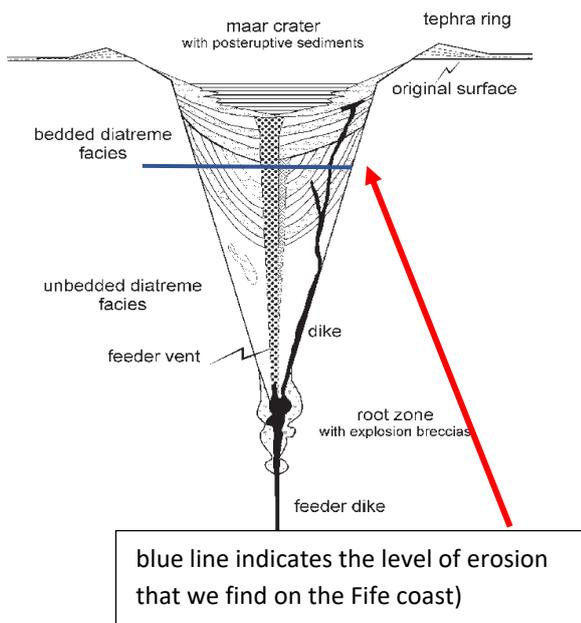


Diagram of a Diatreme (Lorenz 1996)

In this talk, the diatreme at Elie Ness, East Fife was used as an eroded example of this feature. The blue line in the diagram above indicates the approximate level of erosion. At Elie there are bedded tuffs remaining from the pyroclastic surges as tephra was flung high in the air and then settled

to become pyroclastic density currents. The erosive effects of these currents can be seen at the bases of remnant surge deposits lying in beds above the base. At Elie's Ruby Bay, a vent agglomerate indicates that a vent is likely to lie under the bay. Some of the less usual rocks created inside these volcanoes are also found at Elie. A tuffsite and white trap are illustrated below.



Tuffite: Brecciated rocks forming dyke-like intrusions within the diatreme



White trap: carbonated basalt.

Formed by a reaction between the carbonate in the country rocks and the mafic magma

As diatreme grow, country rocks collapse into the vent. A smaller diatreme, at Elie Harbour contains a large block of sandstone which has done just this, deforming as it did so. This deformation has been investigated and it shows that the sandstone has folded rather like a flat paper napkin would if it was being pushed into a glass. At Kinkell Ness and St Monans large blocks of bedded tuff lie vertically with little deformation, showing that they too slid into the vent. High energy gas escape within the diatreme leaves small cryptovents. These too are found at Elie.

Although, in general, the diatremes described here and elsewhere, tend to be of small size (the exposures at Elie are about 500 metres across), diatremes can be much larger as shown in Mexico below.



A Google Earth view of an area of Mexico City showing two overlapping tuff rings. The urban area gives you an idea of the size of these!

Our thanks go to Christine Taylor for her fascinating, well-illustrated talk and for the summary of the lecture she gave on Members' Evening, December 2018.

LECTURE AND FIELD TRIP PROGRAMME

Field Trips 2019

April 14th 13.00 Gordon Liddle

for **14.00** visit to **Victoria Tunnel**

There is a reduced fee of £6 for the Tunnel trip. There will be 14 places available, first come gets the places. Please let negsec@gmail.com know if you would like to reserve a place.

May 19th Lesley Collins
Upper Teasdale geology. Details later.

June 9th 10.30 Ian Killie
Coastal visit in the Cocklawburn area.

Meet southern end of Cocklawburn beach:
GR NU OZT486

July 7th 10.00 Karl Egeland-Eriksen
Trow Point and Marsden

August 3rd 10.00 Louis Golightley
Coldingham and Linkim

September 29th Dr Andy Lane

South Durham, Seaham- Shildon area.

Details to follow

Heritage Open Days

September 13th Chris Taylor
Building Stones of Newcastle

September 20th Dr Andy Lane
Sunderland

Lectures 2019 – 2020

These are the agreed dates for the next lecture series:

Friday October 18th

Friday November 22nd

(This is 4th Friday due to Durham Lumiere)

Friday December 13th

Members Evening

Friday January 17th 2020

Friday February 21st 2020

Friday March 20th 2020 **AGM**

NOUGS field trips which may be open to NEGS members – do check

Saturday 23 February

Devil's Water & West Dipton Burn, Hexham
10.00 a.m. – 3.00 p.m.
Meet 10.00 at roadside parking opposite Kingdom Hall (Jehovah's Witnesses), B6306. SE of Hexham centre.

Sunday 24 March - Lewisburn, Kielder
[details to follow]

Sunday 7 April - Seahouses and Farne Islands **NO NEGS**

Others – not confirmed, but dates for your diary:

May 11/12

Ballantrae Ophiolite, Girvan (Weekend Trip) May TBA

June

Malham & Ingleton (Weekend Trip)

June

Buckham's Walls Burn, Upper Coquet – Mapping Exercise

August 24/25/26

Peebles (Weekend Trip)

September 7/8

Keswick (Weekend Trip)

September TBA

October 5,6,12 or 13

Cowhill&Killhope?

November 2,3,9 or 10

Ouseburn & Victoria Tunnel **NO NEGS**

December 1,7 or 8 TBA

Some members may be interested in the (FREE) upcoming lectures from the **Mining Institute**. n.b. They're in the the **Lit & Phil**, 23 Westgate Rd, Newcastle upon Tyne NE1 1SE

Thursday 21st March 2019, 18:00-19:00

Mining Industry, What Mining Industry?

Paul Bradley CEng, CMgr, FIMMM, MCMI.

Thursday 18th April 2019, 18:00-19:00

Asteroid Mining – Science fiction or the future

Prof. Simon Green, The Open University, Head of Planetary & Space Sciences Research Discipline

Thursday 16th May 2019, 18:00-19:00

The Cumbrian Metallurgical Coal Project

Mark Kirkbrider, CEO, West Cumbria Mining

Thursday 20th June 2019, 18:00-19:00 TBC

CERN's Large Hadron Collider: construction and future studies from a civil engineering prospective

John Osborne FICE, Senior Civil Engineer, CERN