Cymdeithas Daeareg Gogledd Cymru North Wales Geology Association
Issue No 63 NEWSLETTER July 2011

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Chairman's Message:

How great it is that we are once again out in the field, although the weather has not been terribly kind to us. Both our recent excursions took me to places that I have never visited before, and to rocks that I have never appreciated in their solid form. It is very easy to read books and skip lightly over the supposed succession in a particular locality, but quite different to sense the 3D form of an outcrop and relate it to the geological history of the locality.

Over the years, several visits have been made to the area of Nant Ffrancon and Cwm Idwal, but the May excursion took us to Moel Faban and the Cambrian strata which underly the classic Ordovician succession. The outcrops are not spectacular, but the ability to follow the strike of the beds over the valley and appreciate their solid form was very valuable. Cathy's picture proves that it could be seen occasionally, despite very strong wind and driving rain. The extraordinary glacial drainage channel of Bwlch ym Mhwll-le was so abrupt that I almost fell into it before I realised what was happening to the mountainside. A most spectacular finale as we made our way down the mountain.

Equally ancient history was our visit to the Padeswood works of Castle Cement, and to their Cefn Mawr quarry which lies just to the north-west of the focus of the June excursion, Cambrian Quarry. Although limestone has been the key product from the area for centuries, here the sandstones which overlie the limestone were being examined, and the surprise was the steep inclination of the strata. Once again, modelling the disposition of the beds was an interesting challenge. More research is required on the subject of the Cambrian Quarry, which was worked to produce silica, or a pure quartz sandstone with a silica cement, but the exact purpose and market is not known. Historically, a great deal of silica was used to produce refractory linings for the steel industry, but as the newer processes took over, so demand fell.

The mine, however was well known for a paricularly pure silica sand which went to Lever Bros. at Ellesmere Port for the production of Vim scouring powder. As an aside, my Mother-in-Law was well-known for using the expression "Put some Vim in it" if she thought that someone was slacking or not applying sufficient effort. In these enlightened times, with delicate, highly-polished surfaces everywhere, applying fine sand and bleaching powder and rubbing vigorously is not now regarded as a good idea. Vim is no longer sold in the UK, having been replaced by Jif (sorry, Cif) which is gentler, but still has an abrasive mineral content (which is not mentioned among the <20% of the contents which are listed - and you can bet that the majority component is water).

Cue an experiment: suspend the contents of 20ml of Cif "cream with microparticles" in a tall glass of water, allow microparticles to settle, decant, rinse, decant, dry and present the resultant white powder to an X-ray diffractometer. Conclusion: the white powder is calcite, which of course is less hard than quartz. A simple diagnostic field-test for calcite is the fact that it can be scratched with a sharp knife (saves carrying acid), while quartz can not - so Cif will polish your spoons and taps, but Vim would scratch them. Isn't science wonderful?

On a family outing to Portmeirion recently I was struck by the extent to which the architect Clough Williams-Ellis

used the rock outcrops very imaginatively in his fantasy village. Instead of hacking or hiding them away he built onto them, often forming what amount to picture frames in which the inclined and deformed Cambrian strata are most elegantly presented, between Gate House and Bridge House, and below the Chantry. If you do happen to go there, don't be shy to examine the rock close-up as it displays excellent structural textures between the harder sandy beds and softer, muddy ones, and Keith tells me that bioturbation is also common, and well displayed in outcrops along the margin of the fantastic sandy beach. I am sure that Williams-Ellis appreciated the form of the outcrops, which give structure and force the vertical elements of his design and he would be dismayed, I fear, by the mechanical intrusion of rock-bolts into the outcrops.

Collapse would be even more distressing, perhaps?

The Autumn programme is now coming together very nicely, so we hope that we will see you all after the Summer break. Enjoy the weather and the opportunities to seek out new rocks wherever you are.

Jonathan Wilkins

Abstract:
Talk to be delivered on Wednesday 12th October

The last ice sheet and later glaciers in Wales: timings, extents and associated palaeoclimates
How thick was the last ice-sheet in North Wales? This question has been examined by investigating the evidence for glacier erosion on the summit of the Aran ridge in Wales, the highest land in the British Isles south of Snowdonia (see photo on front cover).

Rock which is exposed to cosmic ray bombardment suffers radiation damage to its surface layer – the same layer which is expected to be removed by glacial erosion. Rock which is overlain by a glacier is both covered and subject to erosion, thus keeping the 'clock' set at zero, and it only starts ticking when the ice retreats. So, if an exposed rock is analysed for cosmogenic isotopes, their concentration can be used to measure the length of time the rock surface has been exposed to the atmosphere. Nine samples were analysed in collaboration with Neil Glasser at Aberystwyth University and the NERC Cosmogenic Isotope Analysis Facility. Six samples from the highest parts of the ridge (above 750-800 m) indicate complete ice coverage and glacial erosion of the Aran Ridge at the global Last Glacial Maximum (LGM, around 21,000 years). Three paired samples from the lower parts of the ridge (below 750-800 m) yielded results indicating exposure several millennia after the LGM. The results indicate that the last Welsh Ice Cap was thick enough to completely submerge the Aran ridge and achieve glacial erosion at the LGM. However, between c. 20-17,000 years, the ridge summits were exposed at a time when glacial erosion at lower elevations (below 750-800 m) was continued by large outlet glaciers in the valleys surrounding the mountains.

The last glaciers of Wales are commonly attributed to the Loch Lomond Stadial between c. 12,900 and 11,700 years before present. The correlation of localised cwm glaciation in the Welsh uplands with the Loch Lomond Stadial has been tested and confirmed using pollen stratigraphy at a number of sites, and most recently, using cosmogenic

exposure-age dating. Modelling of glacier and climate interactions can be used to predict the accumulation of snow, and the contemporary sea-level temperature, which is found to be around 6°C cooler than today. The lowest glaciers formed in mountains closest to the modern coasts, such as in the Nantlle and the Rhondda Valley areas, in north and south Wales respectively. Glacier elevations rose quickly with distance inland, suggesting that precipitation increased rapidly inland. However, some low-lying glaciers did exist far inland, such as in parts of the Berwyns, although the low elevations of some of those glaciers was due to large accumulations of windblown snow.

Our work shows that there is a lot that can be done with newer techniques to explore some of the great riddles about the glaciation of North Wales.

Dr Philip Hughes:

University of Manchester

The Beast of Gamlan

The photograph which adorned the front cover of Issue 62 caused considerable comment. Peter Appleton recorded the "Beast of Gamlan" in the Cambrian Gamlan Formation between Gwynfynydd Gold Mine and Rhaeadr Mawddach.

Early postulates for potential identities included giant crinoids, "cone in cone" structure, and trace fossils. Peter has revisited the site and offers the following by way of further explanation:

"I had a closer look at the river-bed outcrop where the metre-long 'fossil' can be seen on a bedding-plane surface. The feature stands out in relief. Three or four metres away was a similar feature showing an oblique section through a darker mudstone layer dissected by 'micro-faulting'. It seems as though the sediments were still only partly consolidated during faulting (slumping ?) as the darker mud has 'bled' into the lighter.

The faults are all in the same dimension and would tend to give the cone-in-cone effect seen in the original feature when looked at normal to the bedding. Other minor faulting, on a slightly larger scale, is seen nearby."

For the moment then – Peter seems to have the nature of the beast settled; unless of course – you know different?

Location, location, location

This month's geological conundrum comes courtesy of Jonathan Wilkins. The origin of a glacial erratic is currently being considered, against the background of where it was found, in Mid Wales (between Rhyader and Llandovery). Jonathan's field description is as follows:

"*a greenish macrocrystalline igneous rock with rounded 3-5mm 'xenoliths' of olivine? and 4-6mm long feldspar laths in a grey, altered groundmass. Weathered examples have calcite spar filling 'vesicles' formed by alteration and erosion of the xenoliths*".

So it's igneous – medium or coarse grained and porphyritic with feldspar porphyroblasts. Hopefully we can consider the potential origin of this rock further in Issue No 64. All views, opinions, comments etc welcomed.

Reviews of events:

GeoScience Wales: 19th April, 2011, David Schofield, BGS "BGS Mapping in North-East Madagascar. Royal Cambrian Academy.

Dave Schofield, as the BGS Chief Geologist in Cardiff, has a very real claim to be considered the Principality's leading Earth Scientist, and the small, but perfectly formed; audience that gathered under the auspices of GeoScience Wales "Cluster" meeting heard a gem of a talk.

David explained how he had taken part in a 4 year International Development Bank funded project to remap the interior of North East Madagascar, updating the work of the original French Colonial Authorities, and subsequent work led by US and UK academic research groups. The logistical challenge of this project was immense, with poor road communications, and limited English speaking support, the BGS generated 20,000 stream sediment samples per year over the 4 year study. Support for some of the foot traverses through the interior involved porterage teams of up to 30 for each mapping geologist.

Geologically the interior presents very ancient metamorphic terrain, with rocks up to 3.2 Ga, typically granitic gneisses and migmatites. There are regions of much younger meta-sediments, possibly associated with a mobile belt, which were overprinted with amphibolite grade metamorphism in Mid – Silurian times. There are hints that this suture differentiates areas of craton which are

of African and Indian origin (ie West and East Gondwanaland respectively).

(KN April 2011)

Geological Society: "Life and the Planet", Burlington House, 5th and 6th May, 2011.

This multi-disciplinary meeting was held under the auspices of a new NERC funded research project, looking at how the biosphere, the geosphere, and increasingly it seems the "anthroposphere" (ie mankind and his created environment) interact with each other. The breadth of the presentations was quite remarkable, with presentations by individuals working in cell micro-biology, hard rock geochemists, climate modellers and even the odd palaeontologist or two.

The highlight for many of the delegates was surely the keynote lecture by James Lovelock, reviewing the history and progress of the "Gaia" concept, now taught in geology departments around the world under the pseudonym "Earth Systems Science".

The overwhelming sensation at the end of the meeting was, for me at least, a subdued sort of stoicism…., yes, this three cornered feedback triangle between man, ecology and geology is very real at the moment. However, in broad geological timescales, the anthroposphere is both entirely time limited, and utterly dependent, on the continued good health, of both the geosphere and biosphere. The geosphere and biosphere are in many ways far less dependent on our activities since, after all, species come, and species go.

To those of us with a geological background that should come as no real surprise. Whether or not those in society making decisions in politics and business, really grasp this concept, seems to be very doubtful.

(KN May 2011)

NWGA Field Visit,
Moel Rachub, 7th May 2011

The field trip started off on the outskirts of Rachub in rather grey and threatening weather with a walk up to the slate quarries. Here there were ample exposures of the purple, red and green slates of the Llanberis Slate Formation (Lower Cambrian). There were numerous examples of green patches of slate which showed definite alteration associated with some quartz veining and patches of a black mineral which could be manganese oxide or fine grained chlorite.

Sadly, the weather turned for the worse, with the threatened rain falling in torrential form which severely dampened enthusiasm for close examination of some of the detail, including the boundary between the slate and the overlying Upper Cambrian Bronllwyd Grits. Examination of the boundary in close detail could have indicated the nature of the boundary, unconformity or faulted, but the weather conditions precluded this.

However, the grits above the slate contained layers of finer grained laminated sediments (see the photograph below) which were distinctly dipping to the south giving clear evidence of our position on the northern limb of the Snowdon syncline.

Dipping laminated sediments

The walk continued up the hill through more small exposures of grits starting with the Upper Cambrian Bronllwyd Grits, succeeded by the Marchlyn Formation which we crossed on the flat plateau, covered by glacial erratics. Again the rain prevented the detailed examination of these. However, there were good examples of what appeared to be nodular tuffs, basic coarse grained intrusives and a stunning volcanic breccia (shown below) which caused some significant debate on the location of its origin, which appeared to be across several glacial watersheds.

Erratic of volcanic breccia

The walk continued to the summit of Moel Faban composed of Carnedd y Filiast Grit before the basal Arenig unconformity on the slopes below (not seen).

Lunch was taken in the shelter of a stone enclosure during which time the rain abated and we examined samples of the rocks provided by the leader Anthony Heeley, including some burned rock found within the peat near the bronze age settlements on the far side of Moel Faban.

As the rain abated good views were seen of the row of glacial corries on the north side of the Glyder range.

The Glyders

After lunch we walked down Moel Faban to the north east side of the hill and passed the bronze age settlement to come abruptly to Bwlch ym Mhwll-le which was invisible to us until we were actually at it rather like a large natural haha.

This feature, as seen in the following photograph, was very impressive, with very steep sides. It is also totally dry indicating that it is no longer part of the local drainage system, but its width and depth suggest that it had been a very active part of Quaternary glacial related drainage in the area.

Bwlch ym Mhwll-le

Again there was debate over whether this was draining an ice dammed lake or subglacial drainage.

(CO'B & JW May 2011)

What about a bronze age open cast copper mine or trial? Particularly as Anthony Heeley's burnt offering may suggest local smelting operations. Editor

NWGA / NEWRIGS Joint Field Visit
Cambrian Mine & Quarry and Rhydymwyn Valley 11th May 2011.

A party of thirteen met on a fine morning at the Cambrian Quarry courtesy of the current land (and mineral!) owner Mr Malcolm Davies of Pantymwyn. The rocks in the immediate area lie in a sedimentologically highly complex situation, and lie on, or very close to a Brigantian / Pendleian structural high that influenced deposition of the Pendleian (ie lowermost Namurian, Pentre Chert, and coeval Cefn y fedw Sandstone. The quarry is full of interesting features including karst / solution weathering of the underlying limestones, hummocky cross stratification in sandstones, and locally intensely bioturbated mudstones / siltstones (*Planolites*).

Cambrian Quarry, Namurian sandstone in the quarry face dip towards the north east.

Whilst some of the party whiled away the morning fossicking in the quarry, a number of people took the opportunity to go underground and visit the remaining open workings in the Cambrian Silica Mine. This was last worked for silica sand in the 1950s, but is now the more remarkable for having been used as, What was then a seemingly convenient, store for large quantities of bagged carbon black.

Cambrian Silica Mine

The workings display a number of interesting features including an intersection with an early lead/zinc shaft, and a remarkably "clean" capping sandstone in the roof. However, near the surface the quality of this cap rock has been severely compromised by deformation, and a number of roof

collapses were evident away from the main adit. The idea has been postulated that the bagged carbon black is now offering its support to roof and pillars!

Cambrian Silica Mine

After lunch (which was taken either in, or in the vicinity of, the Antelope Pub in Rhydymwyn) the party visited the DEFRA site in Rhydymwyn, as guests of the Rhydymwyn Valley Historical Society. There, we were lucky to be given a wonderful guide to the history (both geological and social) of the valley site by Stephen Brown (Access Officer of the Grosvenor Caving Club). The talk covered a remarkable breadth of subject, from Henry 1st's use of lead on castle roofs, to Joseph Priestley's wedding, and the history of the 2nd World War chemical weapon manufacturing facility that had occupied much of the site.

SG Brown and rapt audience

After the talk we were led on a tour around part of the site. Outcrop is rather limited, but rocks were evident which form part of the Holywell Shales the fine grained mudrock of Namurian age that is thought to overlie the lowermost Cefn y fedw Sandstone we had viewed in the morning.

Mudstone with plant debris

JW recovered a sample rich in organic debris and plant remains, whilst a little further down the valley (in an excavation surrounding a former explosive magazine) a sandy mudstone with extensive root networking (possibly lycopodia) was found. This terrestrial soil is indicative of the onset of deltaic / cyclic sedimentation which increased in the Westphalian, and was responsible for the deposition of the Coal Measures.

Close up of root filament – diameter of root 1.5mm

The afternoon was rounded off with a view of one of the site's underground storage caverns, unfortunately access was only available to the area of the portal.

NWGA members' impression of HG Wells' "Eloi"

NEWRIGS Chairman Jaqui Malpas asked for her e-mail contact details to be made available to all NWGA members. It is:

jmalpas@geodiversity.co.uk

(KHN, June 2011)

GeoScience Wales: 20th June 2011, Royal Cambrian Academy.
Andrew Nunn, Dart Energy.

This talk was a thorough technical review of current developments in the field of Coal Bed Methane (CBM) exploitation. The talk covered aspects of coal maturation, gas generation potential, drilling technology and enhanced recovery methods.

The critical role of intrinsic coal permeability was discussed at length. This factor, whilst very difficult to assess during early exploration phases, controls both:

- the lowering of reservoir pressures by pumping of groundwater, so allowing gas to be generated, and

- the efficacy of methane extraction by the directionally drilled recovery wells.

The final part of Andrew's talk was an interesting comparison between the European and American CBM industries with key advantages apparent in Europe due to, amongst other things, the proximity and intensity of population centres to the potential gas fields (makes distribution costs much lower) and the fractured land ownership patterns ("there are always one or two farmers who see the advantages").

(KN, June 2011)

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Dates for your Diary:

Geoscience Wales, Cluster Meeting Monday 18th July, Royal Cambrian Academy, Conwy. 6:00PM for 6:30PM
Jim Harris of Fugro will give a talk on "Plate Tectonic Reconstructions and the Palaeographic and Palaeoclimatic Context for the Development of the Central Atlantic and Greater Gulf of Mexico"

Bridgnorth Walk, Wednesday 24th July, Abberley and Malvern Hills Geofest:
Booking and Joining Instructions through Andrew Jenkinson andrew@scenesetters.co.uk or by telephone 01938 820777

Ysceifiog Dig Open Day, Sunday 31st July, Tan y llan 16th Century Farmstead Project. Part of the Festival of British Archaeology 2011.
Road signs from A541 Mold / Denbigh Road. 11:00AM to 4:00PM
St Asaph Archaeological Society.
Tel 07767705100 for further details

Talacre Land Rover Safari, Wednesday 17th August, Airbus / BHP / ENI – Coastal Ranger led event.
Sand dunes habitat, history & ecology. Starts at Talacre Beach Car Park, SJ 125 848. Prebooking essential (£1 per head) by phone Flintshire Countryside Service -01244 814391

Geomon Guided Walk, Sunday 21st August, Geomon Guided Walk "Rhoscolyn"
3.5 miles, Start at 10AM, Rhoscolyn Church, SH 268 757. Prebooking essential (£5 per head) through geomon@btconnect.com, or by phone – 01407 832555

Dee Estuary Expedition, Wednesday 31st August, CORUS – Coastal Ranger / Dee Wildfowlers led event.
Tidal Flat habitat, history & ecology. Prebooking essential (£3.50 per head) by phone Flintshire Countryside Service -01244 814391

Saturday 3rd September, "Beaumaris Town Walk"
1 mile, Start at 10:30AM, Beaumaris Town Square. Prebooking essential (£5 per head) through geomon@btconnect.com, or by phone – 01407 832555

Friday 9th and Saturday 10th September - Geologist's Association Meeting:
Geoconservation for Science and Society – an agenda for the 21st Century, Worcester
One day conference followed by field excursion to Wren's Nest NNR and other sites. Conference cost £20 for GA members, £30 for others. Registration – by e-mail to Sarah Stafford at: geol.assoc@btinternet.com
(see flyer at rear of this newsletter)

Sunday 18th September, "Bodfari Mine", 10:00AM. NWGA Field Trip:
Morning visit to Bodfari Limestone/haematite mine, Denbighshire. Possible PM visit elsewhere in the locality. Details to be confirmed. Contact Cathy O'Brien.

Sunday 18th September, "Lleiniog Beach and Castle"
2 miles, Start at 10:00AM, Lleiniog Car Park SH 620 790. Prebooking essential (£5 per head) through geomon@btconnect.com, or by phone – 01407 832555

Saturday 1st October, "Penmon"
3 miles, Start at 10:00AM, Penmon Priory Car Park, SH 630 807. Prebooking essential (£5 per head, plus

parking fee) through geomon@btconnect.com, or by phone – 01407 832555

Wednesday 12th October, MGA Evening Lecture.
"Fossil molecules: chemistry as a tool for palaeontologists" 7PM, Williamson Building, Oxford Road

Wednesday 12th October, SGS Evening Lecture.
"Conserving Shropshire's Stone Built Heritage" by Colin Richards MBE Shropshire County Hall, Shrewsbury 7:15PM for 7:30PM. (Nominal charge for non-Members)

Wednesday 12th October, NWGA Meeting: Madog Room, Coleg Llandrillo, Rhos on Sea. 7:00PM
Dr Philip Hughes of Manchester University wil talk on "The last ice sheet and later glaciers in Wales: timings, extents and associated palaeoclimates" The abstract of Phillip's talk is to be published elsewhere in this Newsletter

Sunday 16th October, "Holyhead Mountain Geo-Walk"
6.5 miles, Start at 10:00AM, RSPB Car Park SH 215 803. Prebooking essential (£5 per head) through geomon@btconnect.com, or by phone – 01407 832555

December 17th to 20th, 2011. Palaeontological Association: 55th Annual Meeting, University of Plymouth.
Details from the PalAss website at: http://palass.org/

Web and Social Network News:

The Palaeontological Association have established an outreach website bringing up to date articles on current research, in a readable and accessible format to all. It is well worth a visit at:

http://www.palaeontologyonline.com/

Manchester University has published on line recordings of it's Star Lecture Series – aimed at later years school children. The most recent talk was by (the seemingly omnipresent) Brian Cox, and can be seen at:

http://www.manchester.ac.uk/undergraduate/schoolsandcolleges/starlectures/

A reminder of the existence of our Facebook and Linked-in Social Network Pages:

http://www.facebook.com/group.php?gid=124728527538749

http://www.linkedin.com/groups?mostPopular=&gid=3031675

in addition to our web site proper, at:

http://www.ampyx.org.uk/cdgc/cdgc.html

A brief appeal:

This newsletter needs copy! For younger members, or those unused to the rigours of academic publishing, it can be a useful way of practicing technical writing – with some "soft touch" editing.

Whilst between KN, JW and CO'B there is a wide range of geological background and interest we can't

pretend to cover all the Association's members tastes and interests.

If you see something interesting, hear of something relevant, or simply want to get something of a geological nature please put finger to keyboard, and send something in.

Committee Contacts:

Chair and Website:
Jonathan Wilkins
01492 583052
www.ampyx.org.uk

Meetings Secretary:
Dr Cathy O'Brien
01248 484082
07721 860420
01286 830922
Cathy.obrien@environment-agency.gov.uk

Secretary:
Judith Jenkins
judith.sunfield@yahoo.co.uk

Treasurer:
Frank Buxton
francis62@talktalk.net

Newsletter Editor:
Keith Nicholls
07799 888372
01244 671117
01352 750925
keithandkaren@tiscali.co.uk or
knicholls@geotechnics.co.uk

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The Geologists' Association Two-Day Meeting 2011

GEOCONSERVATION FOR SCIENCE AND SOCIETY:

AN AGENDA FOR THE 21ST CENTURY

9 and 10 September 2011

University of Worcester, St John's Campus, Henwick Grove, Worcester, WR2 6AJ (www.worcester.ac.uk)

This meeting will examine the 21st Century challenges and opportunities for geoconservation and the partnerships required to ensure that our geological heritage continues to be valued and protected as part of the natural environment. It will also celebrate 60 years of successful geoconservation since the first SSSIs were designated.

Programme

The one day conference on 9 September will consist of invited lectures, poster sessions and debates exploring topics including the importance of local groups, funding opportunities, the benefits of raising public awareness and the future of the Geological Conservation Review.

Registration from 9.30am, conference starts at 10am. Lunch and refreshments included. Confirmed speakers include: Professor Rory Mortimore (University of Brighton and ChalkRock Ltd) , Dr Murray Gray (Queen Mary, University of London), Professor Jim Rose (Editor, Proceedings of the Geologists' Association), Phil Harding (Wessex Archaeology and Channel 4's Time Team), Tim Badman (World Heritage Programme, IUCN), Dr Colin Prosser (Natural England), Dr Jonathan Last (English Heritage) and Drew Bennellick (Heritage Lottery Fund).

The one day field trip on 10 September, will visit the Lickey Hills Champions Project, Dudley Museum and Art Gallery and the Wren's Nest National Nature Reserve to examine geoconservation in action and the role of local groups and communities. Departure from the University of Worcester at 9am, returning by 5pm. Lunch, coach travel and field guide included. The field trip is supported and led by the Black Country Geological Society, Dudley Museum and Art Gallery, Herefordshire and Worcestershire Earth Heritage Trust, the Ripples Through Time Project and the West Midlands Regional Group of the Geological Society.

Submission of Poster Abstracts

Offers of posters, including an abstract (max 300 words), should be submitted by email to Sarah Stafford at the Geologists' Association by 1 July 2011. Those accepted will be notified by 15 July 2011. Max size A0. Portrait style preferred but not essential.

Registration Costs

One-day conference registration (9 September): students £15, members* £25; non-members £30

Field trip registration (10 September): students £5, members* £10; non-members £15

Overnight accommodation at the University of Worcester is available at £32 B&B (en-suite). Reservations can be made via the registration form.

***Includes members of the Geologists' Association, Geology Trusts, GeoConservationUK and Affiliated Groups, British Society for Geomorphology and the Quaternary Research Association.**

Registration is essential. For further details and registration please visit:

www.geologistsassociation.org.uk/conferences.html

Student Funding

The Geologists' Association is providing 5 funded places for students. Please see separate application form.

The 5 best student poster abstracts submitted will be selected for the funding award.

For further information please contact Sarah Stafford at the Geologists' Association

Telephone: 020 7434 9298

email: geol.assoc@btinternet.com

www.geologistsassociation.org.uk/conferences.html