



**The newsletter of Malvern U3A Geology Group
April 2016**

The leader

What an interesting lecture we had last month by Peter King, a retired civil engineer, called 'How Geology Affects the Man Made & Natural Landscape'. I imagine that intuitively we all assumed that geology plays a significant part in the civil engineering business, but it was interesting to hear just how detailed and professional the geological investigations are. Peter's detailed knowledge of the subsurface geology of our area and its use during road construction was impressive. April's lecture is by Kate Andrews from the Earth Heritage Trust describing their Building Stones Project which will be a perfect introduction for the outdoor trip to look at the building stones of Malvern later in May.

Regrettably, our rock and minerals course proposed for November is in danger of being cancelled. We currently have only 8 positive attendees, which is probably not enough to make it work. We have to make a decision in April, so please let Dick Harris know if you would like to attend. Nick Chidlaw's previous courses have been very well received.

The new members' introductory sessions are nearing completion. There were 2 outdoors trips in March. One to the Tank and Whitman's Hill Quarries and a second to look at building stones in Worcester city. Despite the poor weather for the first trip, there were some interesting fossil finds at Whitman's Hill – see later for photographic proof!

For those who couldn't make it, I can tell you that we demonstrated our recently acquired microscopes at the last monthly meeting. These are now available for loan; just contact Geoff Carver to make the arrangements.

On 18th May we have our first outdoor field trip of the year. It is to the Eastern side of the Brecons including a climb of the Darrens. The calling notice for this trip is attached to the email and bookings will be taken from 2nd April. Numbers are limited so please book early.

Finally, April sees our latest overseas field trip to the Azores taking place. Let us hope that they have a superb geological experience and of course that the

weather is kind to them too. Those of us not going look forward to the feedback session in May.

Now for something different or “We like to go a wandering.....to Iceland”

David and Gwyneth Adams are those nice people who greet you with a smile and then demand money from you. They are also keen and perceptive travellers as their article now shows. It also adds neatly to the gradual change versus catastrophism debate.

The power of water and ice

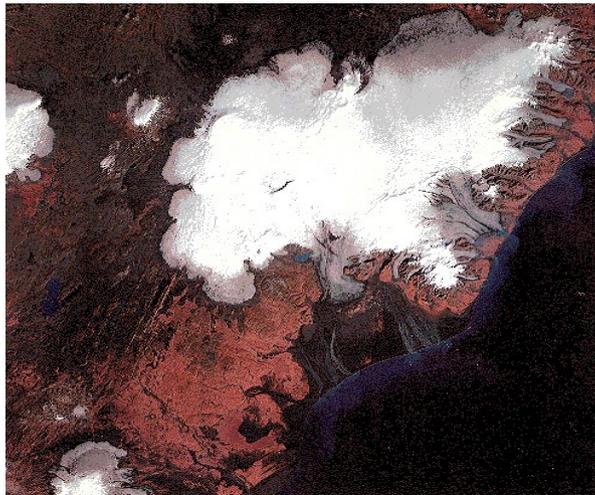
Two of Richard Edwards' lectures in his series on the History of Geology focused on investigating the role of catastrophe in forming landscapes and in particular on the dramatic impact of the sudden release of water dammed up by ice fields. Richard offered Lake Bromyard as a possible example, but the work of J.Harlan Bretz on the scablands of the NW USA showed how controversial, and open to ridicule, such theories could be when first proposed. More recent work has validated his ideas, suggesting that spectacular canyons could be created in as little as 48 hours.

The people of Iceland might be surprised to learn that anyone could doubt the role of water catastrophe in forming landscapes. The canyon of Asbyrgi in NE Iceland measures 3.5 km in length, 1 km across and up to 100 m in depth and as it is horseshoe shaped, until recent times the explanation of this phenomenon seemed to local people to be perfectly simple: the god Odin's giant flying horse, Sleapnir, misjudged his course, put his foot down on terra firma and left behind his hoof print - as you do. When you have 8 legs, it's an easy mistake to make. Current theory differs somewhat: an eruption of the Grimsvotn caldera under the huge Vatnajokull icecap, some 130 km to the south, caused a melting of the ice and a build-up of trapped water. Eventually this was released as a giant jokulhlaup (try *juykootl-kloyp*, literal meaning *glacier-flow*) which charge downstream along the course of the Jokulsa river and gouged out the Asbyrgi canyon in as little as 48 hours. This may have happened twice, once about 10,000 years ago and again 3000 years ago.



A horse's shoe print?

The conjunction of extensive icefields and volcanic activity make Iceland perhaps uniquely susceptible to such events, and hence geologists worldwide use the Icelandic word jokulhlaup to denote glacial outburst floods. Asbyrgi lies to the north of the Vatnajokull icesheet, but in fact the threat it poses most often materialises to the south of it. The sub-glacial lake of Grimsvotn builds up and bursts, on average, about every 5 years, so flooding from this source has always been a routine event for the people of Iceland. In November 1996, however, volcanic activity resulted in a jokulhlaup spectacular even by Icelandic standards. The water was released over a period of only 48 hours, peaking at 50,000 cubic metres per second (think Niagara Falls x 20), a flow exceeded in volume only by the River Amazon. It has been described as the greatest hlaup ever witnessed by man, though a similar event from another Icelandic icefield in 1755 has been calculated at 400,000 cubic m/s. The resultant outflow of debris and silt spread to a width of 15 km, and once it reached the coast 20 km away, the finer silt was deposited as far as 15 km out to sea. The width of the outflow arose from the total flatness of the landscape, itself the result of repeated hlaups and their deposition of everything from huge boulders to fine silt. The area is marked on the map as Skeidararsandur, the original for the generic Icelandic term sandur, meaning the floodplain of a jokulhlaup, and another term borrowed by geologists from the Icelandic.



An aerial view of Vatnajokull: the outflow of water was from the middle (grey) of the 3 glacier tongues projecting to the south. The resultant sandur downstream is clearly visible.



The glacier tongue and the sandur beyond

The area is totally uninhabited and so no lives were lost, Icelanders having worked out some centuries ago that this was not a good place to live. Nonetheless the destruction wrought was dramatic. The sandur is crossed by Route 1, the single road encircling the country. It was only completed in the 1970s and is the sole link between the capital Reykjavik and the east of the country without a 900km detour in the other direction. A 10km stretch of the road was destroyed including a number of bridges, besides the phone and power cables supplying eastern Iceland: hardly surprising when the landscape was left littered with icebergs which had broken off the glacier and weighed up to 1000 tons.



Allow for delays on your journey: Iceland's Ring Road in November 1996

The potency of water held back by glaciers, and the destructive power unleashed when the dam bursts, has long been taken as read by those accustomed to being on its receiving end. J. Harlan Bretz's findings might have found a more positive reception if he had started by publishing in Iceland.

La Palma recalled

Reading this account brought back memories of the group's first overseas field trip to La Palma. Geoff Carver led the group into the Barranco de las Angustias, a canyon formed by a catastrophic release of water from a lake that built up in the caldera, which is such a dominant feature of the island. The first image is a NOAA satellite picture of the island, with the canyon exiting in a roughly south westerly direction.



The second image is in the canyon and shows one of the boulders moved by the flood water.



Geoff Carver

The sun shone whilst we visited and water levels were low, but during rain storms the canyon very rapidly floods. Five incautious tourists were swept away and drowned by one such flood.

How to be an earthquake detector

Many of us have smartphones - and how useful they are, not only for the obvious and occasional telephone call, but for keeping an eye on facebook and what the children/grandchildren are up to. Well now there is a recently

introduced app that turns your phone into a seismometer. Every smartphone contains an accelerometer that is designed to sense its orientation and change the screen display; It is also used in the sat nav function to help you navigate. It is this little device which is used to detect earthquakes. If you have an Android operating system then you can download the app that then turns your telephone into a seismometer and links you into a global network. For a more detailed explanation you should follow this link:

<http://myshake.berkeley.edu/>

If you decide to go ahead, then please share your experiences with us.

Blow, blow thy winter wind

Well half an hour earlier it did...and rain...and sleet. This stalwart group had visited Tank Quarry as part of the new members' induction course. However, by the time they reached Whitman's Hill quarry, things had improved.



Stuart Robinson

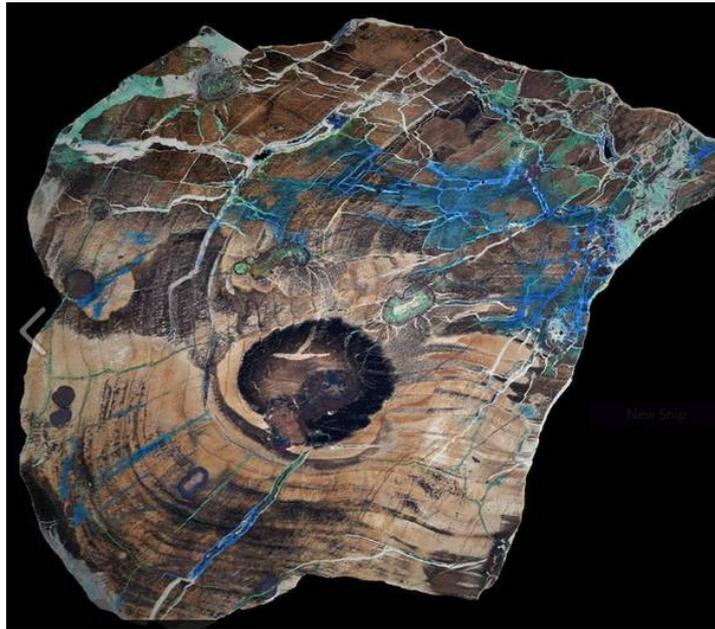
Now this could have been, well, dangerous....

Geologists were using a drone to monitor an active volcano when <http://imagegeo.equ.eu/view/4344/>. You may wish to turn the sound down for this.

Group website

If you missed Professor Fairchild's talk on Snowball Earth, then you can find details here: <http://geology.malvern3a.org.uk/>

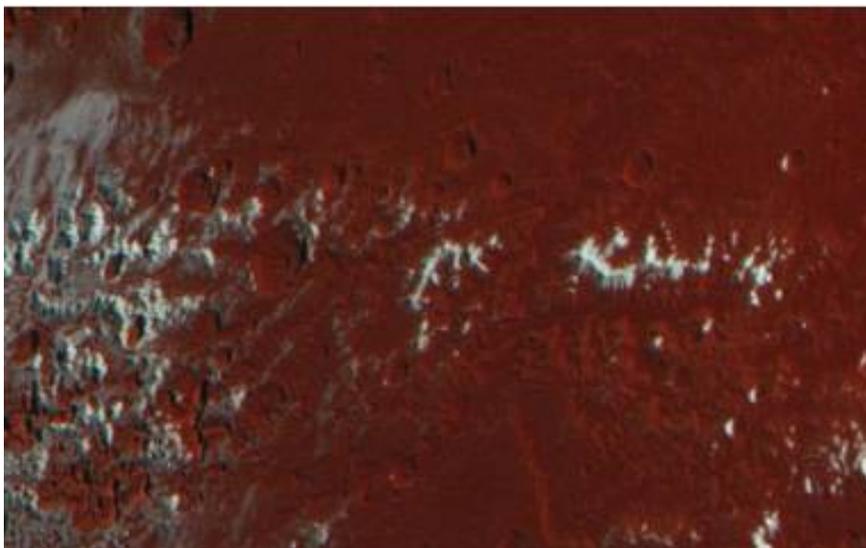
Rock of the month



Well here is a sample that is all three of rock, mineral and fossil. It is fossilised wood that has been infiltrated with mineralising solutions containing malachite, azurite and turquoise. Rather pretty!

A post script

Last month, in passing, I mentioned the pink colouration on Pluto. Well here is a close(ish) NASA view of it. It is caused by chemicals called tholins (put it another way, complex organic gunk). The grey patches are mountains and these are topped with some white material, which has now been identified as methane ice. Just for the record, methane freezes at a temperature of $-182\text{ }^{\circ}\text{C}$.



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