Geology Matters

The newsletter of Malvern U3A geology group
March 2016

The leader

Many thanks to Robert Vernon for his talk on the Metal Mines of North Wales, which was of particular interest to those of us who enjoyed last year's field trip to Anglesey. Our March lecture is by Peter King, a retired civil engineer, called 'How Geology Affects the Man Made & Natural Landscape'.

Are you interested in the proposed residential trip to Bude, Cornwall in September? **If so, please contact David and Gwyneth Adams - the dates are 19 – 23rd September.** More details and the booking form are in the attachment.

I have previously mentioned the purchase of a microscope for the group. Well we now have it ready and available for use. Here are some basic details of the device.

20X-40X-80X stereo, widefield magnification settings

Forward binocular head with precise optical glass lenses

Built-in incident (top) and transmitted (bottom) lights

3MP USB digital camera

A key aspect of this device is that it can project the images onto a screen via the high quality digital camera. This makes it ideal for group use although we would encourage individuals to make use of it too. Having tested the microscope we have decided to buy also a lower magnification microscope camera to complement it. Hopefully we will be able to demonstrate the

microscope in use at a forthcoming monthly meeting. We are developing a loan system and will publish details in due course. In the meantime, contact Geoff Carver if you would like to borrow the equipment.

Support to BGS Mapping

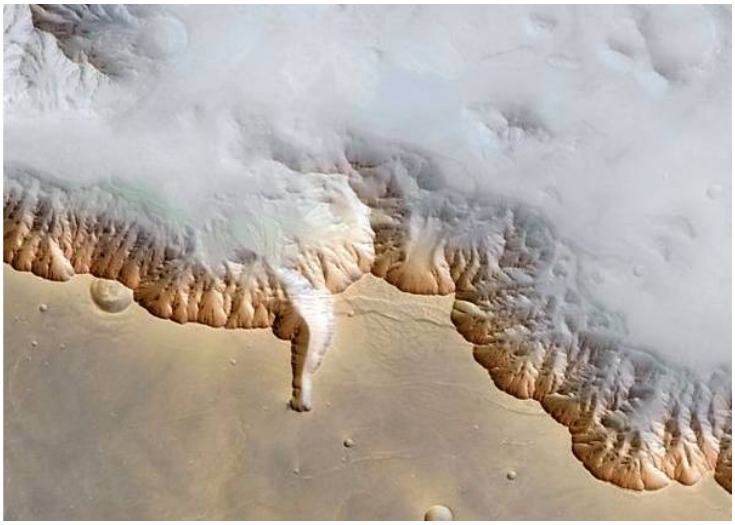
The British Geological Survey has never mapped Sheet 180, the Knighton Sheet which includes parts of NW Herefordshire and over the border into Wales and the Radnor Forest. The most up to date map dates back to Victorian times. BGS no longer has funding to do field work and to survey new areas. A group of local volunteers have started mapping possible sites and finding the rock outcrops. Moira Jenkins, one of our members, is involved and has been asked to form a group to look for graptolites in Radnor Forest. Graptolites evolved quickly and their presence allows the rock layers to be dated accurately. Hopefully this will help distinguish between the Wenlock, Ludlow and Pridoli series of the Silurian. If successful, this will enable more detail to be put on the geology map.

Moira is looking for volunteers to join her group. If you are interested, please contact her and she will send further information. Tel: 01684 569815, email: jenkins.moira@googlemail.com

And now for something other worldly

Last year proved to be a remarkable one for space exploration, with robot probes studying the earth, the moon, a comet and a whole host of other planets Space exploration is more than just very sophisticated rocketry and a very clear emerging trend has been extra terrestrial geology. The cometry landing yielded clues about the building blocks of terrestrial geology and water supply, whilst the first close up pictures of Pluto towards the outer reaches of our solar system showed ice mountains and large areas covered in pink material. There was no way to do justice to all this exciting stuff so I decided to concentrate on the recent discoveries on Mars.

The surface of Mars is a very bleak and inhospitable place for humans with an atmosphere consisting largely of carbon dioxide. Temperatures vary from a balmy 20ºC on the equator to -150ºC at the poles. Such huge differences cause winds and erosive, planet-wide dust storms. Even so it is possible for fog to form in some of the valleys.



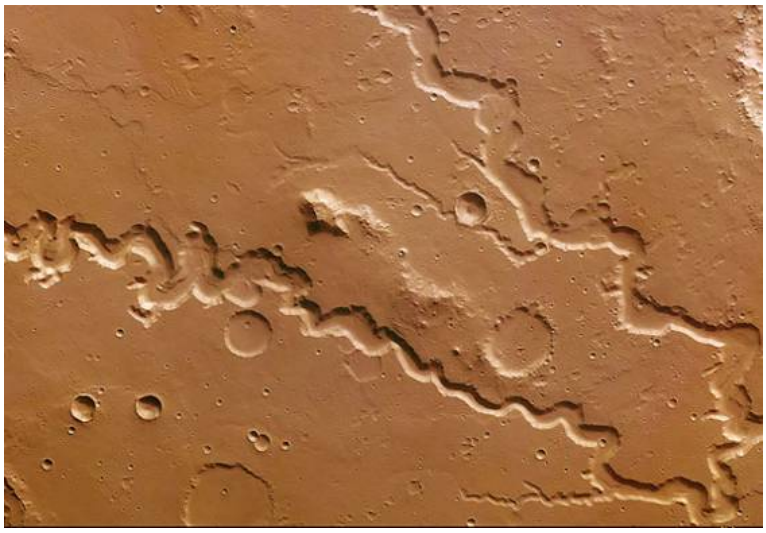
The valleys on Mars are particularly dramatic features, some at over 6km depth and others, many hundreds of kilometres long. The link below is to a ‘fly through’ which highlights geological features en route:

https://www.youtube.com/watch?v=JUbQM47QXwQ

Not only does Mars feature enormous valleys, but also the largest volcano in the solar system – Olympus Mons with a height of 21.2km and a horizontal spread that would see it fit into the borders of France, with little room to spare. Despite this evidence of tectonic activity, there are no signs that Mars has any current activity of this type – these are all very ancient features.

With this satellite view, you can see a large caldera as well as a few much smaller impact craters and numerous lava flows.

The formation of the planet was at the same time as that of the Earth, but little of that original surface is likely to remain due to subsequent weathering. The oldest extant surface is thought to have formed between 4.1 and 3.8 thousand million years BP; it is characterised by many large impact craters and by water formed features.

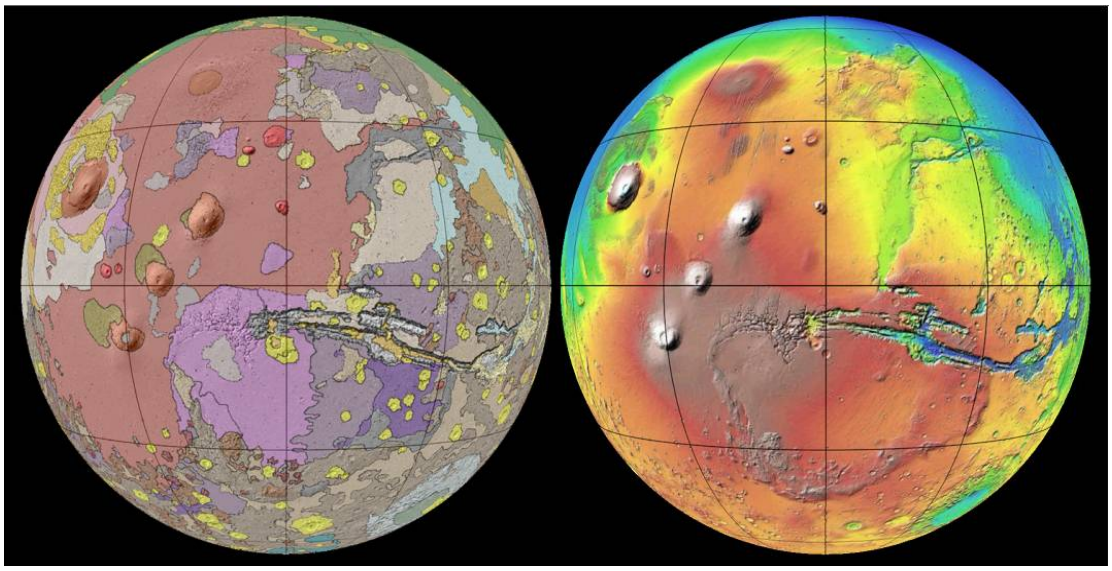
. 

During the next 700 million years there was extensive vulcanism and repeated formation of water drainage channels and small lakes. Clays and gypsum were also laid down. From then on to the present there was little by way of further impacting but lava flows continued; water formed features declined quite markedly as the atmosphere was steadily ablated by solar radiation.

Mars then is likely to be dominated by volcanic and sedimentary rocks. The following image is of a cross bedded sandstone and widely dispersed wind-blown sand. Elsewhere there are finely bedded shales and, of course basalt.

The USGS has now produced a geological map of Mars. As they put it:

“This global geologic map of Mars, which records the distribution of geologic units and landforms on the planet's surface through time, is based on unprecedented variety, quality, and quantity of remotely sensed data acquired since the Viking Orbiters. These data have provided morphologic, topographic, spectral, thermophysical and radar sounding,”



There isn't space here to reproduce the key, but you can obtain it, and a copy of the map, as a free download from:

http://pubs.usgs.gov/sim/3292/

The images in this article are from NASA, they and others are widely available on line.

Not to be left out, the Ordnance Survey has also published a topographical map of part of the planet, which you can find on the OS Flickr page at:

https://www.flickr.com/photos/osmapping/24743699650/

Back to earth

You may recall reading Cec Roberts fascinating account of where to find interesting geology in Pembrokeshire. In order to give you a fuller account of his writing and do him justice we are now publishing his guides on our website.

http://geology.malvernu3a.org.uk/

Jim Handley remains as enthusiastic and active as ever, and here is his account of a recent family outing.

> A bright January weekend found us enjoying Portland Bill with some of our family. On the Sunday my remit was to take a keen 9 year old fossil hunting whilst his brother and dad were sailing. Whilst we did not find the trilobite on his shopping list, he did go home with an impressive piece of an ammonite found sticking out of the Kimmeridge clay at the bottom of a cliff. Nearby was the cast from the outer edge of an ammonite titanites giganteus, whose scale can be gauged from the example in the local hotel wall. Rumour has it that such samples needed the local coastguard helicopter to move them!

Well since we have been talking fossils, let's continue with that theme:

Rock of the month

We mentioned last month that Morocco is a great source of fossil material, so it seemed logical to show you a sample of what is available. Here we can show Jim's grandson what you can achieve with a lot of luck, patience and a great deal of skill:

It delights in the name Dicranurus monstrosus, and as you can clearly see, it is one of the many varieties of trilobite. This particular specimen is being offered for sale at a very modest $995.

Dicranurus ("Twin head-tail") is a genus of Lower Devonian lichid trilobites that lived in a shallow sea that lay between Euramerica and Gondwana, corresponding to modern-day Oklahoma and Morocco, respectively. As such, their fossils are found in those areas.

Their bodies average about 25 mm or so, in length, though their large spines make them at least 50 mm in length. It is speculated that such tremendous spines hampered the ability of predators, such as arthrodire placoderms, to attack them, as well as to help prevent them from sinking into the soft mud of their environment. *Dicranurus* trilobites are distinguished from other lichids by the pair of large, curled, horn-like spines.

Trilobites form one of the earliest known groups of arthropods. The first appearance of trilobites in the fossil record was during the Early Cambrian period (521 million years ago), and they flourished throughout the lower Palaeozoic era before beginning a drawn-out decline to extinction when, during the Devonian, all trilobite orders except Proetida died out. Trilobites finally disappeared in the mass extinction at the end of the Permian about 250 million years ago. The trilobites were among the most successful of all early animals, roaming the oceans for over 270 million years.

Well it's over to you now. Please talk to Geoff Carver about sharing your favourite geological specimen with all our members. We'll do our best to help you with the technicalities – so easy, really! Don't forget that it can be a rock, a mineral or a fossil – the choice is yours.

An afterthought

We tend to think of fossils as occurring only in sedimentary rocks, but if a sedimentary rock is metamorphosed then any fossils will change with it……..

and here we have another trilobite, this time in a bed of slate. It is a fairly low grade metamorphism and so the fossil is quite well preserved.

Who's who?

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