Hello and welcome to the December edition of The Applied Mineralogist! We present a special feature on Asbestos as a geological material and how new understanding is needed. Read about how students are coping with virtual fieldwork. Finally, test your mineralogical mettle on our wordsearch.

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The inaugural Applied Mineralogy Group Open Geoscience virtual talk took place on the 26th of Nov 2020. Our speaker, Dr Phil Renforth, Heriot Watt University, presented on ‘The potential of alkaline mineral materials for CO$_2$ removal from the atmosphere’. The talk was attended by 85 participants from across Europe and Asia and sparked an interesting Q&A session afterwards. Dr Renforth stated that in addition to extensive reduction in greenhouse gas emissions, we may also need to remove billions of tonnes of CO$_2$/yr from the atmosphere to avoid dangerous climate change. Alkaline materials that are produced in numerous industries (cement, by-product slag from steel manufacturing, and red mud from aluminium production) readily react with CO$_2$ to form carbonate minerals, representing stable long-term storage. However, the potential of these materials to prevent climate change has been considered relatively minor because i) they are produced from emission intensive processes, ii) their carbonation potential can typically displace only a small proportion of these emissions, iii) fully exploiting the theoretical potential of current annual production may result in, at best, a total removal of <1 GtCO$_2$ per year. To hear about new modelling results suggesting that with increases in future material demand to meet a growing and developing global population, the CO$_2$ sequestration potential of alkaline materials may be several GtCO$_2$ per year by 2100, please use the following link:

Mineralogical Society YouTube channel: [https://youtu.be/rhkqCDmfq5c](https://youtu.be/rhkqCDmfq5c)

The Curious Case of Lamprophyres in the Mine, 18th February 18:00–19:30 GMT

Dr. Hannah Hughes, Camborne School of Mines, University of Exeter

In collaboration with the North of England Institute of Mining and Mechanical Engineers, Hannah presents a fascinating talk relating to 'rocks that go bang' and gasses in rocks! Check out the abstract and register at:

[https://www.eventbrite.co.uk/e/the-curious-case-of-lamprophyres-in-the-mine-tickets-125450502831](https://www.eventbrite.co.uk/e/the-curious-case-of-lamprophyres-in-the-mine-tickets-125450502831)

Applied Mineralogy Group Open Geoscience Virtual Talk, 26th November

Summary by Dr Alicja Lacinska, BGS

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Future AMG Open Geoscience Talk, 28th January

Register in advance for this meeting: [https://ukri.zoom.us/j/94574899110](https://ukri.zoom.us/j/94574899110) After registering, you will receive a confirmation email containing information about joining the meeting.
As a 3rd year undergraduate Earth Science and Engineering (ESE) student at Imperial College London this year, the Covid-19 pandemic devastated all prospects of timetabled physical fieldwork from national day trips to more demanding month-long mapping projects across Europe. The anxiety surrounding cancelled fieldtrips and the idea that no opportunity meant no development of certain field skills was a worry for my cohort, as well as other geology students nationally and I expect world-wide too. I feel very lucky to belong to the ESE department, which is run by excellent staff who dedicated their time and jumped through hoops to re-arrange students’ timetables, collect data, create new software and new degree content during the intense outbreak of Covid-19. These efforts were made to provide us students with an experience as close to normal fieldwork as is possible in a world where we are confined to our bedrooms for studying to protect ours and others’ health.

The new software I was given to use didn’t come without its difficulties at first. Bugs needed to be fixed after almost every exercise and the overwhelming sense of frustration quickly mounted because of course, I was not truly getting the same hands on experience as I would in the field. However, as the days went by it became clearer that all of us students were in the same boat and there was nothing productive about not making the most of the new content given… so I decided to trust the processes.

The software enabled us to move about in the virtual field environment via avatars that would walk or fly over outcrops. In certain areas of outcrops ‘hotspots’ were highlighted to show particular features of interest which weren’t visible in the resolution of the general locality overview. Hotspots could be 3D models, mobile for analysis within the software or high-resolution photos which captured close ups of minerals, fine textures in outcrops, fossils etc. and they were all paired with objects for scale.

Not only is this type of software useful for highlighting small details but it is also really useful to zoom (or fly in our avatars’ case) so far out from the outcrops in question that you can see much larger scale structures and trends that might stretch hundreds of meters across localities. This is definitely a luxury component to virtual fieldwork! If you needed to zoom in again for a 1m view instead of a 400m view, you could do so with the touch of your keyboard. As well as what we could see on our screens, the tools we used in the software allowed me to practice taking structural measurements and understanding why or in what context we use them: a fully functioning compass clinometer was provided as well as other tools to estimate dips and directions of planes and plunges of folds for example.

Another important silver lining to virtual trips for me has been the access to the social aspect of fieldwork. Unfortunately, working from home will never trump sitting down to relax in the evenings with fellow geologists having discussions about what has been discovered in the day. However, the live ‘Facetime’-type function to the software which is similar to most videocall applications like Zoom or Microsoft Teams meant that questions could be asked, and discussions could still be had in small working groups in real time throughout field exploration. Being able to chat to others and ask for help freely meant that in an isolated environment as students at home, fieldwork prevented us from feeling alone.
Asbestos is a Geological Material
Dr John Faithfull, University of Glasgow

For most people in the UK, the “A” word is one of the most terrifying in terms of health and safety. As an industrial material, asbestos has a unique combination of functionally excellent properties, combined with stealthy deadliness to those inhaling its fibres. In Europe and North America at least, its industrial and construction uses are now banned, and any work which might involve asbestos is controlled by legislation.

But as geologists, we know that asbestos is as natural as landscapes, flowers and bunny rabbits. How does natural, geological asbestos in outcrops, soils, aggregates and specimens fit into these legal frameworks? The short answer is, it doesn’t. The UK asbestos legislation places a wide range of absolute obligations on those who may be working with asbestos. However, any geologists who read the legislation, or Health and Safety Executive (HSE) guidance, hoping for advice on natural rock or mineral materials will find little of direct relevance. The legislation uses mineral names, especially amphiboles, which do not correspond to modern mineralogical terminology, and don’t take into account solid solution; or the fact that these minerals are part of natural rocks and soils; textural words like “fibrous” are not defined, and all the specifics deal only with manufactured materials.

Many of us work with geo-materials which might potentially contain asbestos materials as defined in the legislation, or which might contain other minerals capable of forming dangerous fibres. What should we do? How should we assess risk? How can we quantify hazardous components? How should civil engineers approach blasting, quarrying, mining of processing of such rocks? Who do we ask? Who is qualified to give answers? The existing asbestos resources, like the legislation, provide no answers relevant to naturally-occurring asbestos. But being unable to answer these questions raises the spectre of operational paralysis, due to our unavoidable legal obligations. Meanwhile, many organisations, especially museums, have had to improvise interim procedures and protocols (Horak et al, 2016), but we would hesitate to offer these as definitive guidance to the wider geological community.

In 2015 I co-organised a workshop with Laurie Davies of the Health and Safety Laboratory in Buxton to take an initial look at these issues. We were joined by small group of geologists from BGS and museums plus laboratory managers, asbestos specialists and HSE staff. There was unanimous recognition that existing guidelines did not effectively address the issues faced by those working with rock and mineral materials. We were also unanimous that it would be best if academic, research and industrial geological communities worked to address knowledge gaps, and to develop suitable risk assessment and mitigation. It’s time we started to engage with this seriously.

Fig. 1: Now that’s what I call asbestos! 1m long chrysotile asbestos fibres, with adhering aragonite crystals, from Val Maleno, Italy, in the Hunterian collections. Being safely encapsulated onsite by asbestos contractors in 2018.

Fig. 2: Asbestos or not? A complex, polymineralic serpentinite. Does it contains chrysotile, and if so, is it legally, practically, asbestos?
This process needs broad consultation and engagement, particularly from the analytical labs and mining, quarrying and processing sectors. If you have experience or expertise which might be relevant to this work, or would be interested in a role in taking this forward, the Geological Asbestos Working Group would be very happy to hear from you: drop me an email.

Meanwhile watch this space!

Dr John Faithfull  
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The Hunterian  
University of Glasgow

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Additional resources

https://www.hse.gov.uk/asbestos/ - the HSE asbestos resources and advice

References


Twitter Contest Winner, December 2020

#AppliedMineralogy @FaithfullJohn

From your #ThinSectionThursdays, #FieldworkFridays & #MineralMondays, our #AppliedMineralogy winner is... @FaithfullJohn with some spectacular elongate olivines, enclosed in grey-white plagioclase, and coloured/dark clinopyroxene oikocrysts. From Unit 5, Eastern Layered Intrusion, Rum. Field of view ca 1cm wide.

Science Communication Workshop, For Students and ECR's in the Mineral Sciences

The Mineralogical Society, the Applied Mineralogy Group and the Mineral Deposits Studies Group have organized a writing workshop for students and early career researchers. The course is designed to help us think about how to represent information about our research to make it readable by non-specialists. Please register below if you are interested in attending. This course is open to all. There is no charge and the course will consist of five weekly, one-hour sessions from 22 January–19 February 2021.

Register here: https://www.minersoc.org/science-communication-workshop.html

Staying Virtual

Compiled by Adam Eskdale, Royal Holloway University of London

The Ore Deposits Hub is an open talks platform providing researchers, academics and industry representatives a way to continue to present exciting work that has been going on in the past few months, without the need for in-person presentations. Online lectures cover a whole host of subjects across the economic geology spectrum and deposits across the globe.

Within the last 8 months of 2020, the ODH has delivered 71 seminars from international speakers which has helped build a thriving online geological community, one that will continue into 2021. The ODH will be returning in February 2021 with an all-improved format.

The last talks for 2020 were on December 9th and are recorded on the ODH archive for access.

Find out more information, keep up to date and sign up at: https://oredepositshub.com
Interested in joining the Mineralogical Society and Applied Mineralogy Group?

Go to: https://www.minersoc.org/ for membership details.

WORD SEARCH
For this bulletin’s puzzle, here is a wordsearch with words from the titles of recent Ore Deposit Hub talks. The more you’ve tuned in, the more familiar you will be! Good luck!

ZIRCON   GRAPHITE
ARGILLIC   IOGC
CARBONATITE   TITANITE
KIMBERLITE   HYDROTHERMAL
OROGENIC   TUNGSTEN
PETROCHRONOLOGY   VHMS
ALTERATION   PROPYLITIC
GRAPHITE   MAGNETITE
IOGC   TITANITE

Notes

Get Involved

If you would like to become more involved in the AMG, elections are held yearly at the AGM. Spaces for Student Representatives come up regularly. If you would like to be considered for a committee spot please email Eimear Deady (Chair).

AMG Postgraduate Bursaries

The AMG provides bursaries for postgraduate students in the disciplines of Applied Mineralogy, Crystallography, and Petrology and Geochemistry. Bursaries are intended to support conference attendance and associated travel costs, although other activities may be considered. Application guidelines can be found at www.minersoc.org/amg-bursaries

Please note there are two bursary application deadlines each year: 1st March and 1st September. Requests for funding must be received well in advance of the event to allow for consideration by the committee.

Funding

We welcome applications from both individuals or organisations for funding in support of events covered in the AMG remit. Further guidelines on how to apply can be found at www.minersoc.org/amg-funding

About Us

Founded in 1963 by Norman F.M. Henry, the AMG is a special interest group of the Mineralogical Society of Great Britain and Ireland. We encourage and promote the study and research of mineralogy applied to ores and related industrial mineral materials. This encompasses: ore microscopy, fluid inclusions, nuclear minerals, coals, refractories, slags, ceramics, building materials, nuclear waste disposal, carbon capture and storage, down-hole borehole alteration, and mineral-related health hazards.

Editorial

Thank you to those who have contributed to this issue of Applied Mineralogist. Please forward any articles, comments or notices of events and conferences to amgminsoc@gmail.com. All previous issues of Applied Mineralogist are available at: www.minersoc.org/amg-applied-mineralogist

Calendar

Aug ‘21

3rd European Mineralogical Conference
(Krakow, Poland)

Sep ‘21

SEG 2020 Vision Conference
(Whistler, Canada)

Geochemistry Group 50th An. Symp. & GGRiP
(Oxford, England)