



Volcanic and Magmatic Studies Group

September 2016 Newsletter (No. 32)

Welcome to the third edition of the 2016 VMSG newsletter!

VMSG Conference 2017 - Liverpool

By Jackie Kendrick (University of Liverpool)



Joint Assembly 2017 - Liverpool

VMSG-TSG-BGA 4-6th January

REGISTRATION AND ABSTRACT SUBMISSION IS NOW OPEN for the Joint Assembly of VMSG with the Tectonic study Group (TSG) and British Geophysical Association (BGA) annual meetings. Register before 12th October for the Early Bird rates [HERE](#) and submit your abstract following the guidelines [HERE](#) until 26th October.

The Joint Assembly will consist of cross-disciplinary and focused symposia to encourage integration and collaboration across study groups – A full session list is now available [HERE](#). We particularly invite early career scientists to contribute to the scientific programme and will welcome presentations that represent *Research in Progress*.

Registration will include full access to the 3-day multi-disciplinary scientific programme, teas/coffees/snacks/ lunches and our packed social calendar:

03/01 - Meet-and-Greet at McCooleys
04/01 - Ice-breaker in the Central Teaching Hub
05/01 - Conference dinner and party at Camp and Furnace
06/01 - Authentic Liverpool pub crawl

We look forward to welcome you all in Liverpool, the perfect, vibrant location for this exciting new joint venture! For more details, including area, hotel and restaurant guides, see our website at <https://www.liverpool.ac.uk/tsg-vmsg-bga/> and

don't forget to check back soon for details of our Keynote presentations and Workshops!

Follow us on social media:

Joint Assembly 2017 @GeoLiv2017

#ComeTogether2017

Any queries, contact GeoConf2017@liverpool.ac.uk

Student activities

Luke Hepworth

I'd like to thank the Volcanic and Magmatic Studies Group for invaluable support for my attendance of the Geological Society of America Penrose Conference: Layered Mafic Intrusions and Associated Economic Deposits held in Montana, USA, in August 2016.

As part of my attendance I was able to present a portion of my PhD research entitled "Linking in situ crystallisation and magma replenishment in the Rum Western Layered Intrusion, NW Scotland". A primary focus of this research was to elucidate magmatic processes responsible for the generation of platiniferous Cr-spinel seams in layered peridotites in the Rum Western Layered Intrusion, NW Scotland. The numerous Cr-spinel seams found within the peridotites suggest multiple, much smaller replenishment events than envisaged on Rum. Furthermore, these seams are associated with an intrusive peridotite lithology, suggesting these events occurred within the crystal mush, and not the magma chamber floor. This lithology, an unusual skeletal olivine cumulate termed 'harrisite', originally discovered on Rum, is a key example of in situ crystallisation in layered intrusions. The intimate association of the platiniferous Cr-spinel seams with harrisite suggests these seams also formed in situ and not via gravity settling, a prevalent process in studies on layered intrusions.

The conference gave me an excellent opportunity to meet layered intrusions researchers and fellow post-graduate students, particularly from the US, and discuss a range of topical issues currently being studied from layered intrusions all across the planet. The relaxed and informal setting created an ideal

environment to share ideas and receive crucial feedback often lacking at larger international conferences.

It also gave me an incredible chance to spend four days in the field around the Stillwater Complex, a currently exploited world class platinum deposit, and not only visit the mines but examine the extremely varied layered intrusive rocks associated with these economic deposits and set my own research in context of a much larger layered intrusion, as well as collecting samples for future research endeavours!



Camilla Imarisio

Goldschmidt is the largest yearly Geochemistry meeting and is attended by international experts. Thanks to the VMSG Conference Travel Bursary, I was able to attend the 2016 Goldschmidt conference in Yokohama to present my latest work. My talk was entitled “Numerical Modelling of Magma Plumbing System Interactions at Torfajökull, Iceland: An Insight From the Crystal Cargo” and was included in the “Crystallization Histories and Degassing: From Melt Inclusions to Plumbing Systems” session.

My PhD project focuses on finding geochemical evidence of magma interaction between closely related volcanic centres. Magmatic crystals found in erupted lavas may show zoning and display a variety of microtextures which record their growth history. The variation in composition, size and the type of boundary between zones all provide important information on the petrogenetic history of individual crystals. This can contribute to our understanding of pre-eruptive processes and their effects on volcanic eruption behaviour. My talk was aimed at presenting a new numerical model I’ve been working on as part of my PhD project, aimed at quantifying magmatic processes occurring in shallow crustal plumbing systems, such as magma mixing and crustal contamination.

Attending Goldschmidt this year has enabled me to discuss new ideas in order to improve the model and I received a large amount of interesting feedback from a variety of people with different expertise and background. Throughout the conference, I was also able to attend specialist sessions where I learnt about cutting edge research in the field of crystals and

magmatic studies and there were plenty of opportunities to network and talk to people about their research.

Attending Goldschmidt towards the end of my 2nd year of PhD has enabled me to gain valuable feedback and suggestions on my current research as well as giving me new ideas for future development of my project. I would like to thank VMSG again for their support which has enabled me to have such a great experience.

VMSG Elections 2017

We have 5 candidates for 2 positions on the VMSG committee to serve from 2017-2019. Please take some time to read about their aims for their time on the committee and cast your vote. Closing date to cast your vote is October 12th 2016

You can do this at www.vmsg.org.uk/vote.

The Power of Paleomagnetism

By Mike Petronis (New Mexico Highlands University)

In August 2016, New Mexico Highlands University (NMHU), USA was awarded a \$523,844 grant from the National Science Foundation to purchase a 2G Enterprise Superconducting Rock Magnetometer (SRM) to add to the existing laboratory equipment at the NMHU Paleomagnetic – Rock Magnetic Laboratory, directed by Michael Petronis, PhD. This exciting new tool provides the capability to pursue new studies related to volcanology (magma emplacement, sub-volcanic deformation, relative emplacement ages, ect) in the USA as well as international collaborations around the world. The new SRM places the NMHU lab on par with paleomagnetic laboratories such as at Cal Tech, MIT, Yale, and Berkeley. The SRM allows us to measure extremely weak magnetic fields and is more than a thousand times more sensitive than the existing equipment and it is fully automated – allowing for dramatically faster analysis of a broader variety of samples. Since 2008, the NSF has awarded more than \$1.5 million in grants for the NMHU Paleomagnetic – Rock Magnetic Laboratory.

The NMHU laboratory consists of two dedicated spaces one with a static 56 m³ magnetically shielded low-field room and a dynamic 15.6 m³ magnetically shielded low-field room. Equipment includes a JR-6A Spinner Magnetometer, D-tech Model D-2000 alternating field demagnetizer, Model TD-48-SC thermal demagnetizer, Multi-Function Kappabridge with CS-4 attachment, 7-Tesla Cryogenic Quantum Design Magnetic Measurement System (MPMS-7), an ASC Model IM-10-30 impulse magnet, and a MS3 Bartington magnetic susceptibility meter/core scanning sensor as well as several other instruments (see <http://www.nmhugeology.com/laboratories.html>).

We expect the new SRM to be installed and fully operational by late spring 2017 and invite all faculty, researchers, post-docs,

and students to use the facilities at NMHU. For more information about arranging a visit to the lab, please contact Dr Michael S Petronis (001-505-454-3513; mspetro@nmhu.edu).



The New Mexico Highlands University Paleomagnetic-Rock Magnetic Laboratory equipped with a static 56 m³ (front) and dynamic 15.6 m³ (right) magnetically shielded rooms.

Field Activities

Involved in any field campaigns, got some great volcanological and magmatic photo's to share? This is the section for you!

Gardar Province Expedition 2016, Greenland

By William Hutchinson

In July-August 2016 members of the HiTech AlkCarb project (<http://www.bgs.ac.uk/hiTechAlkCarb>), from the University of St Andrews, visited the Gardar Province in South Greenland. The Gardar is an ancient rift zone that was volcanically and tectonically active between 1300 and 1100 million years ago. Although the province is no longer active, it is of major interest to geologists because the subsequent uplift and glacial erosion have cut deep into the rift and exposed the rocks and magma chambers that once lay well below the surface.

Magma that stalled at upper crustal levels in the Gardar rift evolved to very extreme compositions. This generated high concentrations of incompatible elements, including uranium, thorium, niobium and tantalum, in the tops of these magma chambers. As a result the Gardar Province hosts some of the world's best mineralised magma bodies and our field work aimed to identify the roof zones of these alkaline complexes and understand more about the processes that concentrate the so-called 'rare-earth elements' (REE).

Our focus was the roof zones of the alkaline complexes Ilímaussaq and Motzfeldt. These complexes are only 50 km apart, host significant REE resources and yet their composition and magmatic evolution appears to be quite different. By comparing and contrasting these two unique complexes we wanted to understand whether or not the same underlying processes were taking place.

We were fortunate to have 5 weeks of glorious weather and this allowed spectacular views of the intrusions and detailed sampling surveys to be undertaken. We also had breath-taking views of the fjords, glaciers and mountain ranges of South

Greenland. Intriguingly, despite the compositional differences between the Ilímaussaq and Motzfeldt complexes, we found that the magmatic processes taking place in the roof zones were very similar. In both cases we were able to identify sinuous alkaline dykes and sheets penetrating the country rock, and comparable chemical alteration textures were visible around the margins of each intrusion.

We collected a range of geological samples and our next objective is to characterise rigorously their mineralogy and alteration using petrographic and microanalytical geochemical tools. We will develop a set of geochemical indicators for alkaline roof zones and use these new tools to evaluate other complexes in Europe (e.g., Kaiserstuhl, Germany) and understand whether or not these prospects might offer comparable REE resources to those in the Gardar.

4D Science: Royal Society Summer Exhibition & The Manchester Science Festival

By Jackie Kendrick (University of Liverpool)



This summer the Liverpool Volcanology Group took part in the Royal Society Summer Science Exhibition with a display on 4D Science along with Diamond, the University of Manchester and Unilever.

Over the course of a week more than 14,000 visitors of all ages visited the Royal Society in the heart of central London to see 22 curated exhibits on everything from fungus to surgical robotics to anti-matter. Our 4D Science stand examined the many applications of dynamic experiments, performed in-situ whilst imaging with x-ray tomography – one of which is our high-temperature experiments on real magmas!

You haven't missed the opportunity to visit this exciting exhibit – which will be at the Museum of Science and Industry in Manchester from 24 to 28th October as part of the packed schedule of the Manchester Science Festival.

See more on the event at:

<http://www.manchestersciencefestival.com/>.

Find out more about the research group in Liverpool at:

<https://www.liverpool.ac.uk/earth-ocean-and-ecological-sciences/research/volcanology/>.

VMSG PhD Graduates

A celebration and acknowledgement of volcanic and magmatic geoscientists who have recently graduated with a PhD. Well done to all!

Dr Stefan Lachowycz

The University of Oxford

Records of and controls on temporal variations in activity at arc volcanoes

10/2015

Notices

Upcoming conferences, workshops, & field courses of relevance to the VMSG community:

- New Scientist Live event (Excel, London, 22nd-25th September)
 - Dr Chiara Petrone (Natural History Museum) will be talking at 12:30 on, “Volcano: Ticking Time Bomb” - <https://live.newscientist.com/chiara-maria-petrone/>
 - A team of scientists from the Natural History Museum and Imperial College, including Dr Chiara Petrone, Martin Magnler, Epifanio Vaccaro, Enrica Bonata, and Sam Hill, will be running various activities at the ‘volcano table’. The activities will focus on their research into volcanic eruptions at Popocatepetl, Mexico.

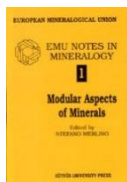
Mineralogical Society bookshop sale

From now until the end of the year, many Mineralogical Society books are being sold at a reduced price.

Vol. 1: Modular aspects of minerals (448 pages)

Edited by S. Merlino

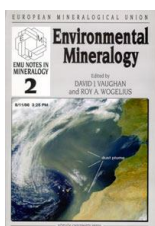
£10



Vol. 2: Environmental mineralogy (434 pages)

Edited by D.J. Vaughan and R. Wogelius

£10



Vol. 8: Nanoscopic approaches in Earth and planetary sciences

Edited by F. Brenker and G. Jordan

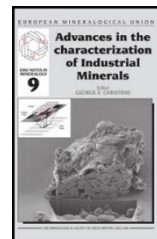
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Vol. 9: Industrial minerals: significance and important characteristics

Edited by G. Christidis, editor

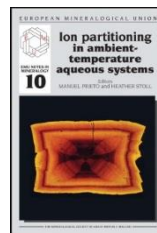
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Vol. 10: Ion partitioning in ambient-temperature aqueous systems

Edited by M. Prieto and H. Stoll, editors

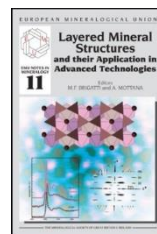
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Vol. 11: Layered mineral structures and their application in advanced technologies

Edited by M.F. Brigatti and A. Mottana, editors

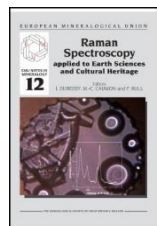
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Vol. 12: Raman Spectroscopy applied to Earth Sciences and Cultural Heritage

Edited by J. Dubessy, M.C. Caumon and F. Rull

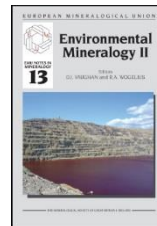
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Vol. 13: Environmental Mineralogy II

Edited by D.J. Vaughan and R.A. Wogelius, editors

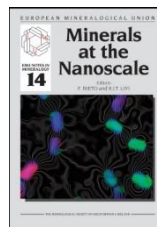
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Vol. 14: Minerals at the Nanoscale

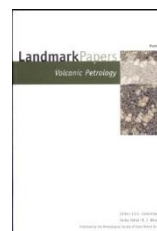
Edited by F. Nieto and K.J.T. Livi, editors

£15



Landmark Papers Volumes 1: *Volcanic Petrology* (I.S.E. Carmichael)

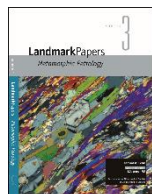
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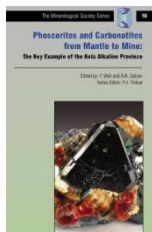
Landmark Papers Volumes 2: *Structure Topology* (F.C. Hawthorne)
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Landmark Papers Volumes 3: *Metamorphic Petrology* (B.W. Evans)
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Phoscorites and Carbonatites from Mantle to Mine: the Key example of the Kola Alkaline Province
Edited by F. Wall and A.N. Zaitsev
£20



Environmental Mineralogy: microbial interactions, anthropogenic influences, contaminated land and waste management
Edited by J. D. Cotter-Howells, L.S. Campbell, E. Valsami-Jones and M. Batchelder.
£10



Fieldtrip Co-ordinator:

Janine Kavanagh has taken on the role of fieldtrip co-ordinator for the VMSG committee, so if you are interested in running a VMSG fieldtrip, please contact her for further information at Janine.Kavanagh@liverpool.ac.uk

Upcoming awards of relevance to the VMSG community:

Do you know an outstanding member of the VMSG community? Please consider nominating them for awards and medals bestowed by other societies. Remember, these recognise both early career scientists as well as those well established. For example:

PhD studentships:

We are collating all VMSG-related PhD studentships for dissemination. Please circulate to interested undergraduate students and others. If you want your PhD to be on the list, please let our student representative know.

<http://www.vmsg.org.uk/students/phd.php>

VMSG Distribution List

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VMSG can also be found on [Twitter](#), [Facebook](#) and [LinkedIn](#).

How to join or leave the group?

Go to the group homepage at www.jiscmail.ac.uk/vmsg and choose the 'Subscribe or Unsubscribe' link from that page. You will receive a confirmation email which you will need to respond to.

Editorial

Many thanks to those who have contributed to this issue. Please forward any articles, comments or notices of events, workshops and conferences before 1st December 2016, for inclusion in the next newsletter. All previous newsletters are available for download from the website.

Dr Craig Magee (c.magee@imperial.ac.uk)