

# 3<sup>rd</sup> International Critical Metals Conference

## Edinburgh, 29<sup>th</sup> April to 2<sup>nd</sup> May

The organising committee are delighted to welcome you to Edinburgh. We have an inspiring three days of presentations, a dedicated poster session and a range of social events planned.



The conference organisers are indebted to our supporters from the academic community, the private sector and NGOs, who have helped make this meeting possible.



Venue:

King Khalid Auditorium, King Khalid Building, Surgeons Quarter, Nicholson Street, Edinburgh, EH8 9DW



Accommodation:

Edinburgh has abundant accommodation options to suit all budgets. Examples of accommodation nearby the conference venue include (but are not limited to): Ibis Edinburgh Centre South Bridge; Jurys Inn Edinburgh; Travelodge Edinburgh Central; Hub by Premier Inn Edinburgh Royal Mile; Apex Grassmarket hotel. There are also many hostels, B&Bs and AirBnB options in Edinburgh.

Dinner suggestions:

Edinburgh has abundant food options but here are few nearby the conference venue:

**Blonde**, 71-75 St. Leonard's St, Edinburgh EH8 9QR. Highly recommend booking.

**Mother India's cafe** 3-5 Infirmary St, EH1 1LT for excellent curry, definitely book!

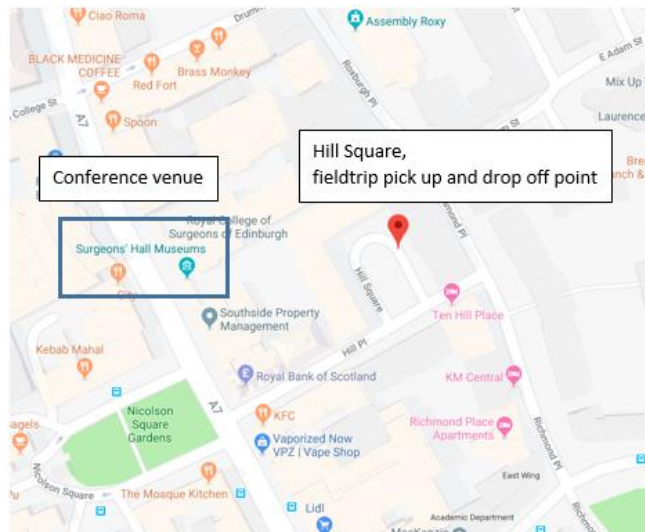
**Spoon**, 6a Nicolson Street, EH8 9DH great food open until 10. Recommend booking!

Your conference registration includes, tea and coffee breaks, lunch and the conference dinner (1<sup>st</sup> of May).

## Programme of events

Monday 29<sup>th</sup> of April – 9:00 am

East Lothian Fieldtrip, Hill Square, fieldtrip participants will be emailed separately with details of the field trip.



Monday 29<sup>th</sup> of April – 14:00 (approx. 1.5 hours)

Optional guided tour of the National Museums Scotland (NMS) Heddle mineral collection, hosted by Dr Rachel Walcott. 12 spaces available. Free. Contact Eimear Deady [eimear@bgs.ac.uk](mailto:eimear@bgs.ac.uk) to reserve your place.



Leadhillite, from the type locality Leadhills, Lanarkshire, UK. Image courtesy NMS©.

Monday 29<sup>th</sup> of April – 18:00-20:00

Icebreaker, registration and refreshments at Hemma, 73 Holyrood Rd, Edinburgh EH8 8AU



Tuesday 30th April

Critical metals for low carbon transport  
convened by Evi Petavratzi and Gus Gunn

08:30 - 09:00

Registration and coffee

09:00 - 09:10

Intro by Eimear Deady, Gus Gunn and Evi Petavratzi

09:10-09:40

**David  
Merriman  
(keynote)**

**The EV Revolution: Impacts on critical raw material supply chains**

09:40-10:00

Michaux

Projected battery minerals and metals global shortage

10:00-10:20

Rietveld

Exploration of worldwide metal demand of low carbon transport and impact of circular economy strategies

10:20-10:40

Butcher

The evaluation and development of lithium brine prospects: examples from the Altiplano Puna, South America

10:40-11:10

Morning coffee

11:10-11:30

Lundhaug\*

How much do we know about material cycles? An application of the MinFuture framework

11:30-11:50

Horn\*

Europe's cobalt resource potential for supply to low-carbon vehicles

11:50-12:10

Danino-  
Perraud\*

A Material Flow Analysis of cobalt: observation on the evolution of the cobalt flows in the European Union from 2008 to 2017

12:10-12:30

Pell\*

Integrating life cycle assessment into the planning stages of critical metal projects

12:30-13:30

Lunch

13:30-14:00	<b>Jacqui Murray (keynote)</b>	<b>Electric vehicle batteries: the UK government perspective</b>
14:00-14:20	Mikkola	Battery mineral project of Geological Survey of Finland, government organisation reacting to rising demand
14:20-14:40	Schmid	Why the European automotive industry struggles to secure its need for critical raw materials
14:40-15:00	White	Low carbon transport and the Sustainable Development Goals: what role should geologists play?
15:00-15:20	Ganev	Impact of EU climate and energy policy on Silicon production
15:20-15:50	Afternoon coffee	
15:50-16:10	Lottermoser	Recovery of critical metals through waste valorisation: Cerro Colorado copper deposit, Rio Tinto, Spain
16:10-16:30	Barnett	The role of a biobased circular economy approach in sustainable critical metal extraction: the rare earth elements
16:30-16:50	Jha	Analysis of Sustainable Manufacturing Approaches for Cobalt and Lithium Titanates as battery materials
17:00-19:00	Poster session	

## Tuesday 30th April 17:00-19:00

### Poster presentations

Alfonso	Mineral chemistry of In-rich minerals from the San José ore deposit, Central Andean Tin Belt, Bolivia
Beard	Geomodels for REE and HFSE exploration in carbonatite and alkaline-silicate magmatic systems
Caven	tbc.
Deady	Volcanic-Derived Placers as a Potential Resource of Rare Earth Elements: The Aksu Diamas Case Study, Turkey

Lacinska	The effect of X-ray energy overlaps on the results of chevkinite $(\text{Ce, La, Ca, Th})_4(\text{Fe}^{2+}, \text{Mg})_2(\text{Ti, Fe}^{3+})_3\text{Si}_4\text{O}_{22}$ microanalysis using SEM EDS-WDS
Li*	Genesis of the Zudong regolith-hosted HREE deposit in South China
Liang	Formation of selenium- and tellurium-containing nanoparticles during the growth of filamentous fungi
Price*	Crystallisation Pathways of Mixed La and Nd Carbonates
Zhou	Rare earth element deposits in China

### Wednesday 1st May

#### Responsible sourcing of critical metals convenors: Megan Barnett and Rob Pell

09:00-09:30	<b>Ben Katz (keynote)</b>	<b>Inside and outside the fence: an integrated approach to cobalt for development</b>
09:30-09:50	Moore	Conflict and critical raw materials production: a tale of antimony production in the Balkans
09:50-10:10	Paneri	Renewable Energy Systems for Sustainable Mining
10:10-10:30	Doyle*	Environmental & Social Maturity as a new concept for self-assessment of best practice in a mining context
10:30-10:50	Caven	Building an ecosystem for change in the responsible sourcing of critical metals – The Impact Facility for Sustainable Mining Communities
10:50-11:30	Morning coffee	
11:30-11:50	Bilham*	A possible framework for responsible sourcing schemes, standards and mechanisms across mineral supply chains
11:50-12:10	Patton	Issues in securing access to critical minerals; experience from Northern Ireland
12:10-12:30	Lusty	Deep-sea mining: A responsible source of critical metals or a step beyond the environmental limits of our planet?
12:30-13:30	Lunch	

**Geology and resources of critical metals I**  
 convenors: David Kaeter and Cristina Villanova-De-Benavent

13:30-14:00	<b>Kathryn Goodenough (keynote)</b>	<b>The geology of decarbonization</b>
14:00-14:20	Grant	Are some Critical Metals a potential secondary resource in modern seafloor massive sulphide deposits? Trace element systematics of sulphides and associated alteration phases from inactive hydrothermal vents at TAG, Mid-Atlantic Ridge
14:20-14:40	Lehrmann	
14:40-15:00	Josso	The critical metal potential of ferromanganese crusts: New insight from the north-east Atlantic
15:00-15:30	Afternoon coffee	
15:30-15:50	Lehtonen	Advanced indicator mineral research concept for the critical mineral exploration in glaciated terrain The Songwe Hill rare earths project, Malawi – geological observations on the recently announced mineral resource upgrade
15:50-16:10	Armitage	
16:10-16:30	Elliott	Fenite exploration criteria surrounding carbonatite-hosted critical metal deposits
16:30-16:50	Beard	Deposit-scale geomodels for REE and HFSE exploration in carbonatite and alkaline-silicate magmatic systems
16:50-17:10	Jenkin	Critical and precious element recovery with environmentally-benign Deep Eutectic Solvents
17:10-17:30	Horsburgh*	Smart Sorting of minerals
19:45 until late	Conference dinner	



Thursday 2nd May

Geology and resources of critical metals II  
convenors: Sam Broom-Fendley and Hannah Grant

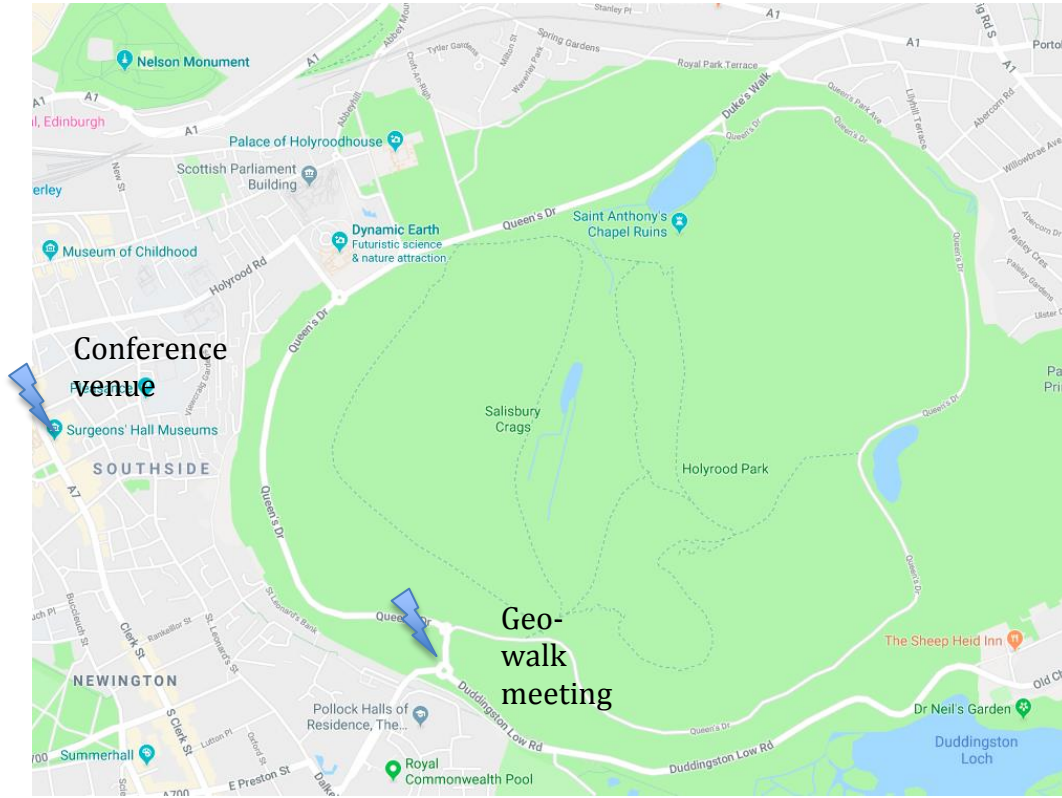
09:00-09:30	<b>Paul Nex (keynote)</b>	<b>Have the Wheels Fallen off your “Hype Cycle”? A retrospective look at criticality: tantalum, rare earth elements and lithium</b>
09:30-09:50	Siegfried*	Scandium as an important critical metal in the quest for reducing carbon dioxide emissions in the 21st century
09:50-10:10	Nwoko*	Elemental Se and Te nanoparticles biosynthesised by <i>Aerobasidium pullulans</i> : Characterization, separation and detection with DLS, AF4-UV-MALS-ICP-MS/MS, spICP-MS and TEM
10:10-10:30	Lima	A new vision for the genesis of Santa Helena breccia, Borralha W deposit NW of Portugal
10:30-10:50	Solferino	Energy Critical Elements (ECE) in the English Lake District - Scar Crag, Dale Head North
10:50-11:20	Morning coffee	
11:20-11:40	Gloaguen	Overview and assessment of the European lithium resources
11:40-12:00	Knoll	Exploring the feasibility of an anatectic model for albite-spodumene pegmatites from the Austroalpine Unit (Eastern Alps)
12:00-12:20	Kaeter*	Two generations of cassiterite in albite–spodumene pegmatites from Leinster, SE Ireland: Implications for tin mineralisation in lithium pegmatites
12:20-13:30	Lunch	

**Geology and resources of critical metals III**  
convenors: Charlie Beard and Nicky Horsburgh

13:30-13:50	Finch	Critical Metal Mineralisation Associated with Magmatic Roof Zones
13:50-14:10	Broom-Fendley	Sulphate-bearing monazite-(Ce) from silicified dolomite carbonatite, Eureka, Namibia: substitution mechanisms, redox state and HREE enrichment
14:10-14:30	Kynicky	The role of carbonate-fluoride melt immiscibility in shallow REE deposits evolution: New evidence from Mongolia
14:30-14:50	Smith	Ion Adsorption Deposits: A comparison of deposits in Madagascar and China
14:50-15:10	Villanova-De-Benavent	Adsorption experiments of REE onto kaolinite in low pH water and NaCl solutions
15:10-15:40	<b>Anouk Borst (ECR keynote)</b>	<b>Peralkaline-hosted Critical Metal Deposits: From magmatic enrichment to hydrothermal mobilisation</b>
15:40-15:45		Conference close - brief address by organisers; Student prizes sponsored by Cornish Lithium and Zeiss

Friday 3<sup>rd</sup> of May 09:30 am - 12:30 pm

Arthurs' Seat Geo-Walk, Holyrood Park, lead by Dr Romesh Palamkumbura. Meet by the roundabout at the junction of Holyrood Park Road and Duddingston Low Road. Further details will be sent out to fieldtrip attendees separately.



Friday 3<sup>rd</sup> of May 10:00 (approx. 1.5 hours)

Second chance for a guided tour of the National Museums Scotland (NMS) Heddle mineral collection, hosted by Dr Rachel Walcott. 12 spaces available. Free.

Contact Eimear Deady [eimear@bgs.ac.uk](mailto:eimear@bgs.ac.uk) to reserve your place.