



2nd February 2023 | Issue 17

Welcome to the (belated) January issue of the G(e)ossip! We hope you had a relaxing break and a very happy New Year, and are settling back into the new term.

The days are slowly getting longer, the spring flowers are starting to blossom and we have made it through the infinite number of days in January. Now it's time to catch up on what department members have been up to over the last few months, and look forward to everything in store over the next year - wishing you all a happy and healthy 2023!

Our newsletters are archived and uploaded on the Geology website. You can access them [here](#).

The G(e)ossip will be released on the last Thursday of each month. If you have feedback or anything to be added to upcoming newsletter issues, please send us an email at [geossip.tcd@gmail.com](mailto:geossip.tcd@gmail.com).

-The G(e)ossip Team

## STAFF IN THE SPOTLIGHT

We would like to welcome **Dr. Swetha Venugopal**, the new Teaching Fellow in the Geology department.

Dr. Swetha Venugopal is the newest member of our department and she joins us as a Teaching Fellow in Igneous and Metamorphic Petrology. She holds a PhD in Volcanology and Geochemistry from Laboratoire Magmas et Volcans in France. Swetha has worked at start-up mineral exploration and geothermal companies in Canada, and has postdoctoral research experience from Cornell University. She comes to us from Houston, Texas where she was a postdoc at NASA Johnson Space Center and the Lunar and Planetary Institute studying the effect of impact events on water distribution and mobility in meteorite mineral phases. Swetha has a wide range of research interests including the triggers that lead to explosive volcanism, volatile behaviour in magmas and ore deposits, and the emission of volcanic gases, hydrogen evolution in the solar system, and the behaviour of water during crater-forming impact events on extraterrestrial bodies.



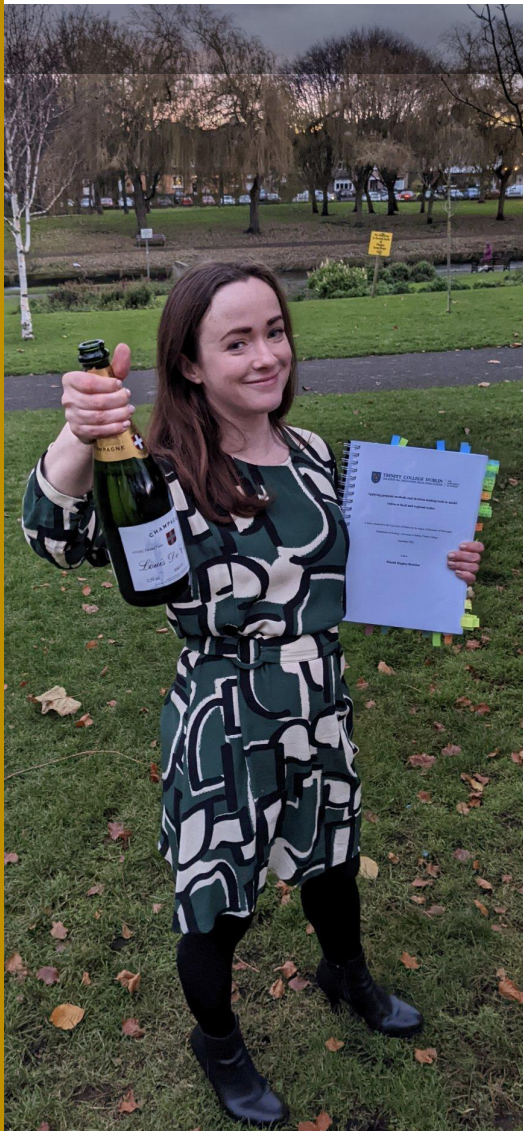
## SCIENCE COMMUNICATION

Some of you may remember department member **Vincent Monchal** was participating in the "I'm a Scientist get me out of here!" program back in October, in the Aluminium zone. The program is supported by SFI and aims to promote science and science studies to students ranging from 8 to 18 years old. Vincent was announced as the winner of the Aluminium zone, as voted for by the students. You can read more about this here: [The Aluminium Zone winner is... – Aluminium Zone \(imascientist.ie\)](#). Many congratulations to Vincent!



## DEPARTMENT NEWS

Huge congratulations to **Meabh Hughes**, who successfully defended her PhD thesis *Applying geogenic methods and decision-making tools to model radon at local and regional scales*.



Congratulations to **Chris Nicholas** who has just been nominated for a second time for the Trinity Excellence in Teaching Awards, (after winning it back in 2013)! You can find out more about the award here:

<https://www.tcd.ie/academicpractice/teaching-learning/teaching-excellence/>

## CONFERENCES

The last few months have been a busy time for conferences, with department members attending and presenting their work at the iCRAG showcase, SCI;COMM22, AGU22 and VMSG 2023.

**Adrienn Szűcs** attended the AGU22 Fall Meeting, Chicago, IL, USA, 12-16 December 2022. (Yes, it was very cold). You can check out her absolutely oversized (1.2mx1.8m, pictured below) poster with an enormous spherulitic Nd-kozoite crystal in the center in M7.

### The Role of Carbonates in the Formation of Bastnasite

Adrienn Szűcs\*, Melaine Maddrell†, Daniel Breyer†, Alexandra Rosenqvist†, Claire O'Donnell†, Sami Laitinen†, Paul Gerritt† and Juan Diego Rodriguez Blanco†

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#### Motivation

A contribution to solving the REE-crisis.

Rare earth elements (REEs) play a critical role in a sustainable and modern future by being essential part of green energy technologies and electronic devices.

Currently, the majority of the REEs are supplied from the REE-carbonate known as **bastnasite**.

The more valuable, "high-risk" HREEs (e.g., Eu or Dy) are typically present in REE-carbonate reservoirs with concentrations below 1%.

To meet our demand for REEs, we must understand: **REEs behavior in carbonate-bearing deposits**

Such would allow us to:

- Utilize better our natural REE-resources
- Improve/invent new innovative REE- recycling techniques.

#### Methods

Mimicking and simplifying nature

REE-rich (La, Pr, Nd, Dy) aqueous solutions and calcite (CaCO<sub>3</sub>), aragonite (CaCO<sub>3</sub>) or dolomite (CaMg(CO<sub>3</sub>)) were interacted at low hydrothermal conditions (25–210 °C). Solid samples were taken at increasing time intervals.

Main analysis techniques:

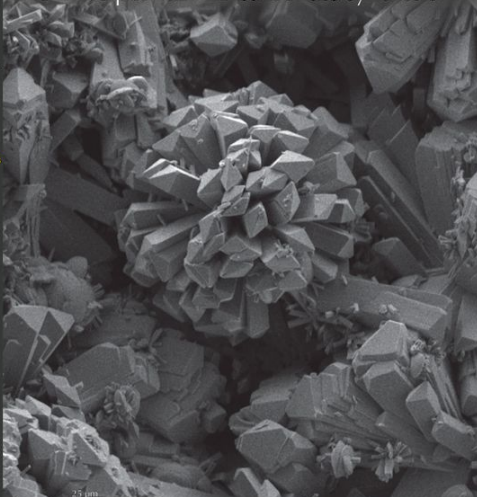
XRD X-ray diffraction  
SEM Scanning Electron Microscopy

REE<sup>3+</sup> CO<sub>3</sub><sup>2-</sup>  
Ca<sup>2+</sup>

REE<sup>3+</sup> CO<sub>3</sub><sup>2-</sup>  
Ca<sup>2+</sup> Mg<sup>2+</sup>

ND data interpretation was done by Brindley refinement software: TOPAS.  
SEM Scanning Electron Microscopy: Aztec™ analysis software.

Bastnasite, our major REEs resource, forms via a multi-step crystallization pathway, revealing the recipes for REE-carbonate synthesis.



### Significance

The findings are globally applicable for:

- the synthesis of different REE-carbonates with tailored structures for further applications
- the production of new innovative materials for further application
- the improvements/innovations of the following REE subjects:

EXPLORATION  
EXTRACTION  
SEPARATION

UTILIZATION  
RECYCLING  
SUSTAINABILITY

### Key results

The reaction starts with a solvent-mediated REE-carbonate precipitate, which slowly covers the host grain and eventually fully-replace the host carbonate grains.

Governing factors – what makes a difference

- the temperature
- the ionic radius of the involved REE
- the solubility of the host mineral.

The crystallization pathway – recipes for targeted material synthesis

The crystallization pathway of hydroxybastnasite with La, Pr or Nd present follows a 3-step crystallization sequence:

Lanthanite (RE<sub>2</sub>(CO<sub>3</sub>)<sub>6</sub>·nH<sub>2</sub>O)  
Kozoite (La<sub>2</sub>(CO<sub>3</sub>)<sub>2</sub>(OH)<sub>2</sub>)  
Hydroxybastnasite (RE<sub>2</sub>(OH)(CO<sub>3</sub>)<sub>2</sub>)

The crystallization pathway of hydroxybastnasite with Dy present follows a 2-step crystallization sequence:

Tengerite (Dy<sub>2</sub>(CO<sub>3</sub>)<sub>2</sub>·3H<sub>2</sub>O)  
Kozoite (Dy<sub>2</sub>(CO<sub>3</sub>)<sub>2</sub>(OH)<sub>2</sub>)

For further information about the research, the authors and sponsors, please visit the QR code.

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## CONFERENCES

Several members of the department attended the VMSG meeting, London, 4 - 7th January 2023. We presented lots of interesting talks and posters over the 3 days, as well as meeting other researchers learning what they are up to. We also had the fantastic opportunity of attending the conference dinner at the Natural History Museum, London (see photo), surrounded by some of the Museum's rock collection and of course the dinosaur.





## DEPARTMENT NEWS

The **Trinity Geological Museum** have recently been awarded a grant from GSI to begin digitising the museum collections. The aim is to database, georeference and do some imaging - and ultimately make the specimen data widely available and searchable. They will be setting up an Arctos database for this (<https://arctosdb.org/>). First up is the the Prof. Holland fossil collection from the Silurian of the Dingle Peninsula.

You can follow the museum on Twitter and Instagram @TCDGeoMuseum, they are located in Unit 24 at TTEC. If anyone is interested and would like to visit the museum (pictured), please get in touch with Una Farrell or Patrick Wyse Jackson beforehand to book a trip!



Pictured above left is a taster of some of the specimens in the museum; above right is some digitisation-in-progress

## FIELDWORK

**Quentin Crowley, Nancy Riggs and Brian McConnell** (recently retired from GSI) carried out fieldwork on the South Connemara Group as a follow-up to Nancy's Fulbright research there.



## CONTRIBUTIONS

Got anything coming up? Any conferences, field work, publications, talks? Let us know at [gossip.tcd@gmail.com](mailto:gossip.tcd@gmail.com) to be featured in the next newsletter.



**Chris Nichols** is now acting as Director for a new geological survey of the Albertine Rift in Uganda for the Ugandan Government, as well as having devised the project and field plan. The Albertine Rift is the northern sector of the Western Arm of the East African Rift System (EARS). The principal aim of the project is, over the next 3 years, to document and understand how tectonic and sedimentary processes active in the rift today can be used to help interpret past structure and original depositional environments, exposed in Plio-Pleistocene outcrop.

To do this, up to 30 field personnel are split into 3 teams, each investigating a different aspect of rift geology, feeding back the data to form a coherent synthesis. We have 30 Ugandan geologists split into 3 teams of mappers working across the Lake Albert and Lake Edward basins. We just did our first season in December just before Christmas, but the project will be running for the next 3 years.



Photos: Top: Local animals in the field area. Bottom: Drone photo looking south-west along the edge of the Lake Albert Rift Basin, northern Lake Albert, Uganda.



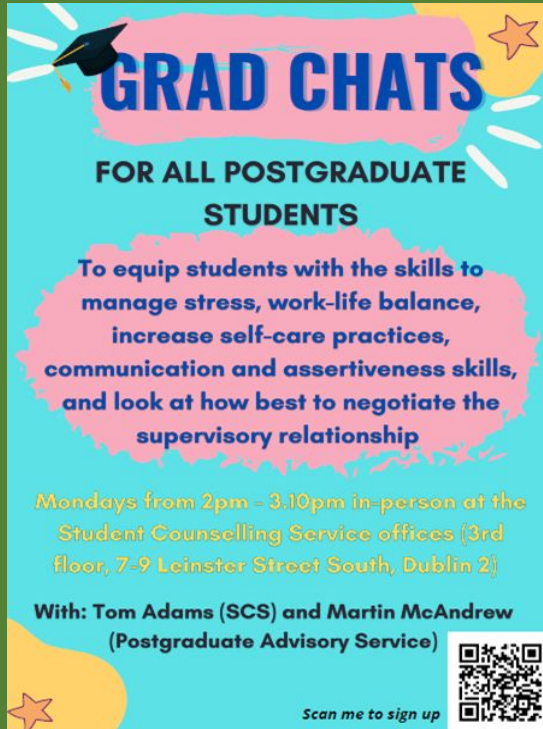


## UPCOMING CONFERENCE

The 66th Irish Geological Research Meeting is taking place in Belfast from 3-5th March. Info and registration:

<https://www.gsi.ie/en-ie/events-and-news/events/Pages/66th-Irish-Geological-Research-Meeting-2023.aspx>

## POSTGRAD SUPPORT




**GRAD CHATS**  
FOR ALL POSTGRADUATE STUDENTS

To equip students with the skills to manage stress, work-life balance, increase self-care practices, communication and assertiveness skills, and look at how best to negotiate the supervisory relationship

Mondays from 2pm - 3.10pm in-person at the Student Counselling Service offices (3rd floor, 7-9 Leinster Street South, Dublin 2)

With: Tom Adams (SCS) and Martin McAndrew (Postgraduate Advisory Service)

Scan me to sign up



Learn more on the PG Grad Chats [webpage](#) and pre-register for sessions [here](#).

## GEOLOGY IN THE NEWS

A group from the School of Natural Sciences at the University of Galway have discovered what is being hailed as one of the most “exceptional and striking fossil finds in the last century”.

They found more than 200 complete sea urchin fossils dated to 350 million years ago. The fossils were discovered at Hook’s Head, a location which may be familiar to some of you as the

second year Wexford field trip visits it. You can read more about the discovery [here](#), and the paper describing the find is available at [here](#).



## MENTAL HEALTH MATTERS

TCD’s Student Counselling Services is open and available to all registered students.

Check out their website [here](#) to read about the services they provide, email them at [student-counselling@tcd.ie](mailto:student-counselling@tcd.ie) to request an appointment, and follow them on Instagram at [@tcd headspace](#) for mindfulness and mental health awareness tips. They now offer [PhD research support groups to](#) keep you on track!

## PUBLICATIONS

Emma L Horn, Rex N Taylor, Thomas M Gernon, **Michael J Stock**, E M Ruth Farley, Composition and Petrology of a Mush-Bearing Magma Reservoir beneath Tenerife, *Journal of Petrology*, Volume 63, Issue 10, October 2022, egac095, <https://doi.org/10.1093/petrology/egac095>

**Patrick N. Wyse Jackson, Louise Caulfield**, Aidan Forde, Iseult Conlon and Peter Cox (2022) Valentia Slate, Co. Kerry, Ireland: Heritage Stone. *Irish Journal of Earth Sciences* **40**, 87–104.

**Patrick N. Wyse Jackson and Louise M. Caulfield** (2023) The rough and the smooth: stone use in Dublin 1720–1760. In Christine Casey and Melanie Hayes (eds) *Enriching Architecture: craft and its conservation in Anglo-Irish building production, 1660–1760*. UCL Press, London, pp. 234–261.

Pointon, M.A.; Smyth, H.; Omma, J.E.; Morton, A.C.; Schneider, S.; Hülse, P.; Rippington, S.J.; Lopez-Mir, B.; **Crowley, Q.G.**; Millar, I.; Whitehouse, M.J.; Frei, D.; Scott, R.A.; Flowerdew, M.J. A Multi-proxy Provenance Study of Late Carboniferous to Middle Jurassic Sandstones in the Eastern Sverdrup Basin and Its Bearing on Arctic Palaeogeographic Reconstructions. *Geosciences* 2023, **13**, 10. [DOI](#).

Vucinic, L., O’Connell, D., Dubber, D., **Coxon, C.** & Gill, L. (2023) Multiple fluorescence approaches to identify rapid changes in microbial indicators at karst springs. *Journal of Contaminant Hydrology* 254, 104129. (<https://doi.org/10.1016/j.jconhyd.2022.104129>)