

European Association of Geochemistry



www.eag.eu.com

2020 EAG AWARDS

Harold Urey Award to Jillian Banfield



The recipient of the 2020 Harold Urey Award is Jillian Banfield, from the University of California-Berkeley (USA). Dr. Banfield is a pioneer in the area of geobiology, using state-of-the-art approaches in both Earth sciences and biological sciences to better understand how the intimate interactions of the microbiota help to define the geochemistry of our planet. Much of what we know about the microbiome of Earth's subsurface

stems from the interdisciplinary work of Dr. Banfield and her colleagues. By combining the expertise and skills of a trained geologist with the modern techniques and approaches of molecular microbiology, Dr. Banfield has provided us with a new appreciation of the role(s) of microbes in shaping the geochemistry of the Earth.

Werner Stumm Science Innovation Award to Kevin Rosso



The recipient of the 2020 Science Innovation Award, named in honor of Werner Stumm (for his innovative work in low-temperature and surface geochemistry), is Kevin Rosso of the Pacific Northwest National Laboratory (Washington, USA). Dr. Rosso's genius has been to recognize the behavior and function of the electronic band structure, band bending, and the potential charge gradient buildup in semiconducting minerals. He

uses these highly complex constructs to understand growth/dissolution, adsorption/desorption, aggregation/disaggregation, and catalytic activity that these critical minerals present with surrounding fluids and microorganisms. Key projects include, but are not limited to, (1) characterizing the kinetics and mechanisms of elementary charge and ion transport processes in redox transformation of semiconducting minerals, (2) predicting molecular-scale electron transfer kinetics in microbially mediated reduction of bioavailable transition metals in subsurface environments, and (3) studying mechanisms of heterogeneous reduction of contaminant U(VI) and Tc(VII) by Fe(II)-bearing minerals.

Houtermans Award to Kun Wang



The recipient of the 2020 Houtermans Award is Kun Wang, from Washington University (St. Louis, Missouri, USA). Prof. Kun Wang's work, using high-precision isotopic analysis by multi-collector inductively coupled plasma mass spectrometry of the moderately volatile elements Zn, Cu, and K in Earth, planetary, and meteoritic materials, is making a significant contribution to the field of cosmochemistry. His work on K isotopes, in

particular, is reshaping ideas about the origin of the Moon by a giant impact, the relationships and differences between groups of meteorites and their parent bodies, and high-temperature geochemical fractionation processes. In a remarkable series of papers, he has firmly established the robustness of K isotope measurements and the applicability of that isotope to a wide range of geochemical problems.



The wider context. Trekking across lava flows in Iceland.

THE VALUE OF FIELD TRAINING IN GEOCHEMISTRY

Field work is a key part of training for many geological careers. From locating and describing new deposits to excavating rocks and fossils, to identifying structural relationships between different geological units, fieldwork is essential for geologists to gain a better understanding and appreciation of the geological problems being studied. But what about for geochemists, whose work is often based mainly in the laboratory? Should they be interested in field work? How can they acquire field skills, and why do they need them?

Many PhD and early career scientists in geochemistry come from geological backgrounds, and undergraduate degrees in geology usually include at least a few modules that offer national and international field training. Geology undergraduates, therefore, gain very early in their career invaluable field-related skills, such as geological mapping, which are sought by many employers. In contrast, other geochemists may enter the field via the chemistry or biology route. While the field training provided by these degrees helps them develop broad and important scientific skills, such as hypothesis testing and experimental design, the scientific focus may not always be related to the Earth sciences.

Having been a geology undergraduate myself, I was introduced to the world of field work right from the go, and before I discovered the wonders of geochemistry. Throughout my later studies, I have had the opportunity to combine both geochemistry and field work – the two things I'm most passionate about – in my research projects. For my PhD, I am investigating volcanic rocks from Mongolia in order to decipher their origin and evolution in terms of petrology, geochemistry



At the outcrop. Observations and discussions are key to unraveling the eruption histories of volcanic deposits. Tenerife, Canary Islands.

SOCIETY NEWS



Moving in closer. Examining detailed relationships between volcanic deposits and lavas in Mongolia.

and geochronology. Another aspect of my work aims to understand mantle dynamics and the processes that lead to magmatism in such an unusual (intraplate) tectonic setting: this I do by investigating Sr and Nd isotopic signatures. Geochemistry is, thus, a key part of my PhD, as was the fieldwork I conducted in Mongolia to acquire my samples. By undertaking the sampling myself, I had the opportunity to critically evaluate the different sites and samples in the field, observe the field relations and identify chronologically different units, and get a much more complete picture of the geological context of the area.

Recently, I had the opportunity to attend a geological field course in Tenerife (one of Spain's Canary Islands), kindly sponsored by the European Association of Geochemistry (EAG) through the Student Sponsorship Program (read my report on the EAG blog at http://blog. eag.eu.com). By participating in the course, I hoped to learn and develop several skills - identifying and sampling volcanic deposits, understanding the volcanic history of an area through field observations - that would be important both for my PhD and for my future career prospects. These skills should allow me to better understand aspects of my current research that are related more to physical volcanology than to geochemistry or petrology. Furthermore, I will be able to expand my future research interests to include studies of relevant deposits and will feel much more confident when working with and sampling relevant material in the field. More importantly for me, as a geochemist, I will be more confident in geochemically analysing and interpreting the materials if I understand their depositional context.

At first glance one might think that field skills are only distantly related to the job of a geochemist. But I believe there are four good reasons why such skills are extremely useful and contribute towards a better understanding of the analysed material and the geological problem. First, being able to recognise and collect the correct sample has a big impact on the outcome of any geochemical analysis, which saves time and money. Fresh volcanic rocks, for example, will give reliable analyses on which robust models and hypotheses can be made. Altered or weathered rocks, or samples taken from a different chronological unit, will give erroneous results and warrant an avoidable second field season. Second, directly observing different systems and processes in situ allows you to properly understand the sampling conditions and any variables affecting them that you might not have thought of if you hadn't gone into the field. Third, there is the organisation and preparation of the field trip itself. When conducting field work in remote areas like Mongolia, good planning and preparation are essential. Managing accommodation, transport, site access, local contacts, getting supplies, locating the most important sites to sample, as well as thinking about health and safety issues (e.g. vaccinations), are some



The fine detail: Mantle xenolith in basalt, Hungary.

of many challenges that need to be overcome in order to obtain the vital geological samples. Fourth, working in the field is an excellent opportunity to travel around the world, meet new people and cultures, and get the chance to network, make new friends and colleagues, and gain more geological knowledge and, not least, new research ideas!

So, if you feel your field skills need brushing up, or if you need some specific skills for a new area of research, what can you do? There are various opportunities for PhD students and early career scientists to develop and improve their field skills. You could choose to attend or demonstrate on undergraduate field trips organised by your university, or to sign up for a field course or trip run by a scientific society or other external institution. Another possibility is to take part in field trips associated with any conferences and workshops you attend (e.g., Goldschmidt, https://goldschmidt.info/2020/eventTypeView?type=355). Another option might be to offer to help as a field assistant for a colleague or fellow research student. Most importantly, never hesitate to speak to your supervisor about getting training in any aspect of field work or sampling if you feel you need it!

Getting Ready for a Field Trip – What You Need!

A few backpack essentials for any scientist working in the field:

- Maps, an all-weather field notebook, pens, pencils and permanent markers, sampling bags or containers, a compass clinometer, hand lens, hammer, and hard hat.
- Hiking/walking boots and suitable clothing (waterproofs, warm clothes, sunhat, sunglasses). A high visibility jacket is also a good safety item to pack.
- Sun cream and insect repellent.
- First-aid kit (including any medication prescribed by your doctor).
- Charged mobile phone and digital camera.
- Duct tape mends everything from ripped tents to torn boots!

Martha Papadopoulou, PhD student University of Leicester, UK

COMMUNITY CALL OUT: YOUR STORIES FROM THE FIELD

Do you have a funny, unusual, or fascinating story from one of your adventures in the field? We'd love to hear your anecdotes and share them on the EAG Blogosphere or in a future EAG Society News item for *Elements*! If you would like to contribute, please send your story (one or two short paragraphs with a photo) to: office@eag.eu.com.

7