Geological Survey
Suirbhéireacht Gheolaíochta
Ireland | Éireann

Roinn Cumarsáide, Gníomhaithe
ar son na hAeráide & Comhshaoil
Department of Communications,
Climate Action & Environment

FULBRIGHT
Ireland-USA

Outgoing Fulbright Student (2016/2017)

Ms Saskia Ryan *(Isotope geochemistry) TCD*
Strontium Isotopes: A detailed assessment of element cycling through the biosphere

The objective of this doctoral research is to use strontium isotopes, expressed as 87Sr/86Sr, as a tracer for environmental processes, including 87Sr/86Sr variations during weathering and uptake into the biosphere through plants and animals. This is being realised by carrying out systematic and high resolution geochemical sampling, using a variety of different media, to better understand the complexity of 87Sr/86Sr in the biosphere.
Background: Sr is a non-essential nutrient but readily substitutes for calcium (Ca), not only in geological materials, but also in plant and animal tissues. Variations in 87Sr/86Sr preserved in plants and animals are controlled by the bioavailable Sr during nutrient uptake and absorption. Whilst biosphere 87Sr/86Sr values vary spatially, the processes effecting these variations are not fully understood.
Using both stable and radiogenic isotopes for environmental, forensic and archaeological applications is a discipline that is growing rapidly. The ability to track the movement and behaviour of Sr in the environment enables geologists to know more about weathering and element availability and allows archaeologists to learn more about the mobility and life histories of past peoples. Of particular importance is the role of the geologist in designing both interdisciplinary research and collaborative projects in a global research context. Ultimately, it is expected that my proposed Ph.D. research will contribute to this process.
This pioneering project seeks to test three key hypotheses.

1. How suitable are soils, plant material and stream water for the purpose of characterising bioavailable Sr and can they be used to better understand mass balance contributions from different Sr reservoirs?
2. Do glacial deposits and anthropogenic inputs influence the natural local Sr signature?
3. Can the mapped spatial variation in modern biosphere 87Sr/86Sr values be used successfully to determine archaeological population provenance?

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Outgoing Fulbright Scholar (2016/2017)

Dr Helen Lewis*, UCD*
Geoarchaeology and traditions of practice in the EU and USA: gaps in (inter)national standards and training in cultural resources management.

The project involves using specific aspects of geomorphological (landform and sedimentary) and pedological processes to better understand and predict the archaeological record before and during archaeological assessment for cultural resources management (CRM - contract archaeology carried out in advance of construction and environmental management). It is focused on cultures of practice, aiming to explore how and why different states define 'best practice' in assessment in different ways, and using the example of geoarchaeology for environmental, landscape and site-specific reconstruction. Geoarchaeology applications show

great variation from state-to-state, with no clear rhyme or reason in terms of best practice, but apparently based on local traditions of practice in archaeology. The absence of these approaches in assessment stages of environmental protection studies is a great loss in those states where they do not occur. This project will look at why this variation exists, and will a set of universal (international) guidelines that all states can use, addressing the reasons for this variation. Please note that this project will not be examining geophysical or geochemical mapping, except to note that it occurs (presence/absence), as these remote sensing applications are commonly applied, and do not show the variation under study. Likewise, the project will not examine materials-based approaches (e.g. metals or lithics sourcing or provenancing) or geochronological dating, as these post-excavation approaches vary depending on the curated collection and availability of additional financing, and are not part of standard CRM guidelines in the USA or EU. The occurrence of these approaches will simply be noted if mentioned in assessment documents and guidelines.

Outgoing Fulbright Scholar (2017/2018)

Dr Aggeliki Georgiopoulou *(Marine Geology) UCD*
Submarine Landslide Scar Investigations using Diving Equipment and Structure for Motion Techniques (Slidesee)

Dr Georgiopoulou has been awarded a Fulbright-GSI Scholarship to visit USGS Woods Hole Coastal and Marine Science Centre, Woods Hole, Massachusetts for 5 months in 2018 to continue her research on submarine mass movements.

Submarine landslides are voluminous remobilisations of slope sediments, that for the North Atlantic margins that are categorised as passive and tectonically "quiet", they can be the primary cause of tsunamis. Understanding the mechanics of submarine slope instability is therefore critical in assessing the tsunami risk in the North Atlantic and beyond. The Fulbright funded research will help: (i) characterise the morphology of near-vertical submarine slide scarps, (ii) reveal the rupture mechanism and the mode of rupture propagation, (iii) identify the role alternate lithologies play in generating retrogressive failures.

Dr Georgiopoulou has participated in, or led, more than 12 marine research cruises on 9 international marine research vessels and has been lecturing in marine geology and sedimentology since 2009. Outstanding contributions to the field include: developing novel methods to map the morphology of submarine landslide headwall scarps using Remotely Operated Vehicles; research in the field of submarine mass movements and their consequences; and basement-controlled multi-phase slope collapse; and the age, initiation and processes of giant submarine slides.

Outgoing Fulbright (2018/2019)

Mr Gavin Kenny, TCD
Understanding the role of impact cratering in Earth's evolution through high-precision geochronology

This project is one of a range research projects that utilise different craters around the world to shed light on fundamental processes in impact cratering on Earth and other Solar System bodies, such as the Moon. One of his current focuses is how can we obtain accurate and precise dates for impact craters so we can interrogate whether they might have occurred at the same time as mass extinction events.

There is general agreement now that the mass extinction we arguably understand best – the K-Pg boundary event that was so detrimental to dinosaurs – was related to the enormous Chicxulub impact crater off Mexico's Yucatán Peninsula. However, there are a number of other extinction events in the Phanerozoic that we don't understand so well – and lots of big impact craters too. Working with Prof Mark Schmitz at Boise State University, this project will develop protocols for high-precision dating of impact craters with minerals (namely zircon) that experienced extremely high temperatures and pressures during these events, i.e. minerals that were shocked. One crater of particular interest is the >50 km Siljan structure, Sweden. There is good reason to believe that this crater was formed by a massive impact at some time in the late Devonian but constraints must be improved to say whether it may, or may not, have overlapped with the mass extinctions at this time.

Outgoing Fulbright-GSI Scholar (2020)

Dr Brenda McNally, TCD
Advancing Public Perceptions of Geothermal Energy in Ireland

Dr Brenda McNally is a media and communications researcher specialising in public perceptions and engagement with Climate Change and Energy Transitions. Her research examines the social aspects of climate change focussing on the political, ethical and cultural challenges and contributes to communications practice aimed at building a Just Transition.

As a Fulbright-GSI Scholar, Dr McNally will visit the School for Future Innovation in Society at Arizona State University and the Centre for Science and Technology Policy Research at University of Colorado Boulder to learn more about the role of socio-ecological imaginaries and how experts in public engagement studies incorporate futures thinking and creative collaborations to engage citizens with energy transition. This knowledge will be used to develop novel insights on advancing public perceptions of geothermal energy in Ireland. The role society is crucial in shaping innovation processes as part of our responses to climate change and societal involvement with the geothermal sector in Ireland is an under-researched area. The Fulbright scholarship will enable Dr McNally to develop workshops aimed at understanding the social values and needs in innovation pathways for a sustainable and low carbon future and how they can be harnessed to mobilise and motivate citizen engagement with geothermal energy.

Upon returning to Ireland, she will draw on her Fulbright experience to continue her work on climate imaginaries and to investigate the production and circulation of ideas about energy transition through new forms of promotion in digital media and popular culture.