Clayton R Magill, PhD PhD

Assistant Professor; Lyell Research Fellow

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RESEARCH INTERESTS

Molecular isotope (HCNOS) biogeochemistry; archaeometry; environmental forensics; novel biomarker development for ecological keystone species (e.g., plants and insects) and human-engineered trace organic compounds – viz. microplastics – in environmental matrices.

EDUCATION

2×PhD: Geosciences and **Biogeochemistry** (8.2008–05.2013)
The Pennsylvania State University
Dissertation: *Biomarker and isotopic perspectives on early Pleistocene climate in East Africa*
Doctoral defence: 19 December 2012
Primary supervisor: Katherine H Freeman

MPhil: Quaternary Science (8.2006–5.2008)
University of Cambridge
Thesis: *Intraspecific $\delta^{18}O$ values as an indication of seasonality in a Mesolithic shell midden*
Primary supervisors: Nicholas J Shackleton (deceased) and Tamsin O'Connell

BPhil: Chemistry and **International Studies** (8.2001–5.2006)
University of Pittsburgh
Thesis: *Reconstruction of Holocene climate variability within the central Mediterranean using lake sediments from Crete*
Primary supervisors: Mark Abbot and Michael F Rosenmeier

PROFESSIONAL APPOINTMENTS

- ◊ **Assistant Professor** at the Lyell Centre (Heriot-Watt University; 1.2019–active)
- ◊ **Research Fellow** at the Lyell Centre (Heriot-Watt University; 9.2016–1.2019)
- ◊ Max Planck Institute of Chemistry **Postdoctoral Fellow** (advisor: Gerald H Haug; 5.2015–8.2016)
- ◊ Marie Curie Actions **Postdoctoral Fellow** at ETH Zürich (advisor: Timothy I Eglinton; 5.2013 – 5.2015)
- ◊ National Science Foundation (NSF) GK12 **Teaching Fellow** (Penn State University; 8.2011–5.2013)
- ◊ **Graduate Research Assistant**, *Department of Geosciences* (Penn State University; 8.2008–5.2011)
- ◊ **Graduate Research Assistant**, *Department of Archaeology* (University of Cambridge; 8.2006–5.2007)
- ◊ **Associate Instructor** at Yellowstone National Park Field Station (6.2005–12.2005)

RECENT AND SELECT PUBLICATIONS

[§] Denotes role as primary supervisor

Stancampiano LM[§], Panera J, Rubio-Jara S, Peterson K, **Magill CR** (In preparation). Evidence of human controlled fires at Acheulean site of Valdocarros II (Spain, MIS 8/7). *Proceedings of the National Academy of Sciences USA.*

Plint T[§], **Magill CR** (Accepted) Large mammal tracks in 1.8-million-year-old volcanic ash (Tuff I[F], Bed I) at Olduvai Gorge, Tanzania. *Ichnos*.

Nikolova C, **Magill CR**, Ijaz UZ, Kleindienst S, Joye SB, Gutierrez T (Accepted) Response and oil degradation activities of a northeast Atlantic bacterial community to biogenic and synthetic surfactants. *ISME Journal*.

Ausín B, **Magill CR**, Haghipour N, Fernández Á, Wacker L, Hodell D, Baumann KH, Eglinton TI (2020) (In)coherent multiproxy signals in marine sediments: implications for high-resolution paleoclimate reconstruction. *Earth and Planetary Science Letters* 515:38.

Busch A, Han F[§], **Magill CR** (2019) Paleofloral dependence of coal methane sorption capacity. *International Journal of Coal Geology* 27:103232.

Liu J, Zheng Y, **Magill CR**, Lin H, Wang X, Li M, Liu Y, Yu M, Zhao M, Xin Y, Pedentchouk N, Lea-Smith DJ, Zhang W-J, Zhong H, Tian J (2019) Proliferation of hydrocarbon degrading microbes at the bottom of the Mariana Trench. *Microbiome* 7:47.

Magill CR, Eglinton G, Eglinton TI (2019) Isotopic variance among plant lipid homologues correlates with biodiversity patterns of their source communities. *PLOS One* 14:e0212211.

Magill CR, Wenk P, Ausin B, McIntyre C, Skinner L, Martinez-Garcia A, Hodell DA, Haug GH, Kenney W, Eglinton TI (2018) Hydrodynamics influence organic carbon accumulation in ocean margin sediments. *Nature Communications* 9:4690.

McClure SB, **Magill CR**, Podrug E, Moore A, Culleton BJ, Kennett DJ (2018) Fatty acid-specific d^{13}C values reveal earliest Mediterranean cheese production 7,200 years ago. *PLOS One* 13:e0202807.

Magill CR, Ashley GM, Domínguez-Rodrigo M, Freeman KH (2016) Biomarker evidence for local plants and water that shaped early human subsistence behaviors. *Proceedings of the National Academy of Sciences USA* 113:2874.

Magill CR, Denis EH, Freeman KH (2015). Rapid sequential separation of sedimentary lipid biomarkers via selective accelerated solvent extraction. *Organic Geochemistry* 88:29.

Magill CR, Ashley GM, Freeman KH (2013) Water, plants, and early human habitats in eastern Africa. *Proceedings of the National Academy of Sciences USA* 110:1175.

Magill CR, Ashley GM, Freeman KH (2013) Ecosystem variability and early human habitats in eastern Africa. *Proceedings of the National Academy of Sciences USA* 110:1167.

SELECT GRANTS, AWARDS AND HONORS

Pending decision: Natural Environment Research Council (NERC) standard large grant **£2.7M** (Co-PI; £1.8M of total budget; 9.2021-8.2024): *GeoFORECAST* (GEOlogic Fate Of biodegRadablE miCroplastics in Aquatic SedimenTs)

Thermo Fisher Scientific infrastructure award **£70k** (PI; 9.2019–active): *Collaborative development of ASE for disabilities-inclusive science research*

American Chemical Society (ACS) New Directions **£142k** (PI; 10.2017-10.2019) *Primary plant material as a screening method for coalbed methane sweet-spotting*

Elsevier *Organic Geochemistry* grant for research **£10k** (PI; 8.2019-9.2019) *Deuterium measurements of individual lignin methoxy groups*

Leakey Foundation **$24k** (PI; 1.2017-1.2019) *An evaluation of termite-associated hydrocarbon signatures as an influence on prey selectivity and an ecological signal for chimpanzees and Olduvai hominins*

Carnegie Trust **£19k** (co-I; 10.2018-10.2019) *Probing for recent euxinia*

Marie Curie Actions **€208k** (PI; 5.2013–5.2015) *Interdisciplinary molecular and isotopic perspectives on tropical climate and ecosystem change since the Last Glacial Maximum*

- ◊ **Fellow** of the National Museums Scotland (NMS; Inducted 8.2019)
- ◊ **Fellow** of the Royal Botanical Gardens (RBG; Inducted 1.2017)
- ◊ **Young Investigator's Award** (Awarded by European Science Foundation [ESF]; 9.2014)
- ◊ **Cozzarelli Prize** in Physical and Mathematical Sciences (Awarded by the *National Academy of Sciences USA* [*PNAS*]; 1.2013)
- ◊ **Outstanding paper** in Paleoclimatology (Awarded by American Geophysical Union [AGU]; 2.2012)

Media Coverage: *BBC*, *CNN*, *Daily Mail*, *La Figaro*, *Nature News*, *Science* (AAAS) *Editors' Choice*, *Science Daily*, *The Guardian*, *The Telegraph*, and *The Scotsman*, among others. My research has also been the focus of feature articles in *National Geographic* magazine, *Smithsonian Magazine*, and *Inverse Science* web/blog page. Several recent highlights include:

- *National Geographic* article: 'Hints of 7,200-year-old cheese create a scientific stink' (9.2018)
- *BBC World Service* radio interview: 'World's oldest cheese' (04.2018)
- *Daily Mail* article: 'Could you survive on bugs? Early humans feasted on termites as long as 1.8 million years ago' (4.2017)
- *ACS Central Science* article: 'Aboard the isotope time machine' (3.2016)
- *Scientific American* article: 'Climate change may have spurred human evolution' (3.2013)

SUPERVISION AND TEACHING

Heriot-Watt University (***Supervision***)

[§] Denotes role as primary supervisor

◊ *Tommaso Paoloni*; (PhD 3.2019–active [dissertation co-advisor])
Dissertation: Molecular and isotopic signatures of bottom-water oxygen concentrations in surface-sediment foraminiferal tests

◊ *Tessa Plint* (PhD 1.2019–active)[§]
Dissertation: Molecular, stable- and radio-isotope constraints on cetacean (whale) behaviour and ecophysiology

◊ *Lavinia Stancampiano* (PhD 1.2018–active)[§]
Dissertation: Reconstructing past hominid landscapes with ecohydrologic constrains on diet

◊ *Eleonora Amurri* (MA 8.2020–active)[§]
Thesis: Tracing patterns of hydrocarbon contamination in the River Almond

◊ *Lena Narman* (PhD 8.2016–11.2019)[§]
Dissertation: Carbon transfer across a river-shelf-basin transect into the South China Sea

◊ *Lama Almajayda* (MSc 1.2018–12.2018 [thesis co-advisor])
Thesis: Optical properties and stable isotope analysis of dissolved organic matter (DOM) fractions

◊ *Jonathan Wilkin* (MSc 1.2017–12.2017 [thesis co-advisor])
Thesis: Organic geochemical signatures in contourites in the Gulf of Cadiz

University College London (***Supervision***)

◊ *Anna Cutmore* (PhD 8.2017–active [dissertation co-advisor])
Dissertation: Phylogenetic influences on modern epicuticular waxes and their application to deglacial North Atlantic deep-sea sediments

ETH Zürich (***Supervision***)

◊ *Julia Krawielicki* (PhD 1.2016–9.2019)[§]
Dissertation: Unraveling 30 Ma of tectonic, climate and vegetation changes in north east Africa using molecular isotopic biomarkers

◊ *Mischa Haas* (MSc 1.2015–10.2015 [thesis co-advisor])
Thesis: Radiocarbon dating of leaf waxes in the Kurtak loess-paleosol sequence, central China

◊ *Julia Krawielicki* (MSc 1.2014–10.2014 [thesis co-advisor])
Thesis: Molecular stratigraphic reconstruction of the paleohydrology during the Late Messinian Salinity Crisis in northern Italy

◊ *Pascal Wenk* (MSc 1.2014–10.2014)[§]
Thesis: Grain size-specific organic carbon isotope stratigraphy of Iberian Margin sediments

Heriot-Watt University (***Teaching***)

◊ *Economics, Policy and Risk in SubSurface Energy Systems* (1.2018–3.2021; 30% [Policy] load)
Description: This Master's block-course (15 credit) introduces students to the fundamentals of decarbonizing (geo)energy systems, and the associated importance of risk assessment, economics and policy as society pushes towards cleaner energies.

◊ *Catchment Hydrology* (9.2018–12.2018, 2019, 2020; 100% load)
Description: This undergraduate, once-weekly (2 hr) lecture course with corresponding practical (2 hr weekly; 30 credit total) for second/third year undergraduate students about the essential basics of hydrologic cycling, processes and interactions within an integrated theoretical and applied framework.

◊ *Dynamic Earth* (9.2020–12.2020; 20% [Earth history] load)
Description: This undergraduate, twice-weekly (2×1 hr; 15 credit) lecture course focuses on spatial distribution and timescales of Earth systems change, and further introduces students to the anthropogenic influence of humans on natural systems.

◊ *Transitional Gas Energy Systems* (9.2020–12.2020; 20% [Sources and histories] load)
Description: This Master's block-course (15 credit) explores the nature and temporary promise of natural gas as a transitional fuel, from reservoir to consumer.

◊ *Research Knowledge Exchange* (1.-4.2017, 2018, 2019; 100% load)
Description: This once-weekly (2 hr; 15 credit) course introduces incoming graduate students to the essential basics of developing graduate research projects via lectures and in-class activities, which focus on clear written/oral communication skills.

ADDITIONAL ROLES AND RESPONSIBILITIES

Advisor/consultant to Police Scotland (*Poileas Alba* [forensics]), National Museum Scotland (NMS *Collections*), and the Scottish Marine Animal Stranding Scheme (SMASS).

Associate Editor at *PLOS One* ([Paleo]Ecology and Botany) and *Journal of Visualized Experiments* (*JoVE;* Organic and Geochemical Techniques).

Outreach and Public Engagement Committee member (*Heriot-Watt University*; 1.2016–active)

Three Minute Thesis (3MT) Finals Competition organizer and judge (*Heriot-Watt University*; 6.2018; 2019)

Session convener at *Goldschmidt Conference* (10e: Novel insights into Earth and environmental processes through radiocarbon and biogeochemistry; 7.2018)

SELECT INVITED COMMUNICATIONS

- ◊ 'How molecular signatures connect between scales in space and time' (UK GeoEnergy Observatories [UKGEOS]; 10.2019)
- ◊ 'Isotope ratio mass spectrometry: state-of-the-art and future directions' (University of Edinburgh; 5.2019)
- ◊ 'Organic insights into ancient Eurasian dairying practices' (Scottish Universities Environmental Research Centre [SUERC]; 10.2018)
- ◊ 'Geochemical fossils as emerging proxies of landscape change: an organic approach' (Newcastle University; 2.2018)
- ◊ 'Tracing prehistoric (agri)culture – molecular isotopic insights' (British Geological Survey [BGS]; 12.2017)
- ◊ 'Leaving a mark: how (paleo)environments are recorded by plant-derived biochemical fossils' (Royal Botanical Garden Edinburgh [RGBE] *Christmas Lecture*; 12.2016)
- ◊ 'A marriage of convenience: pairing carbon and hydrogen isotope values to reconstruct (eco)hydrology' (Gordon Research Conference – Organic Geochemistry; 08.2015)