

# Dr. Michael J. Henehan



School of Earth Sciences, University of Bristol, Wills Memorial Building, Queen's Road, Bristol BS8 1RJ, UK  
Phone: +44 117 456 0868 Web: [www.michaelhenehan.science](http://www.michaelhenehan.science) E-Mail: [michael.henehan@bristol.ac.uk](mailto:michael.henehan@bristol.ac.uk)

ORCID: [0000-0003-4706-1233](https://orcid.org/0000-0003-4706-1233)  
Github: [@michaelhenehan](https://github.com/michaelhenehan)

## Education

### PhD, Geochemistry and Palaeoclimate, University of Southampton

2009 - 2013

*Title:* "Ground-truthing the boron-based proxies". *Project Supervisors:* Prof. Gavin L. Foster, Prof. Paul A. Wilson, Prof. Jonathan Erez. *Examiners:* Prof. James C. Zachos and Prof. Martin R. Palmer.

### M/Sci, Palaeontology and Evolution, University of Bristol

2005-2009

First Class Honours. *Tutor:* Prof. Michael J. Benton, FRS. *Project Supervisor:* Prof. Daniela Schmidt

## Research Interests

- Development and application of palaeoclimate proxies (geochemical and micropalaeontological), towards better understanding past climate, climate sensitivity, chemical weathering regimes and carbon-cycle perturbations.
- Understanding biogeochemical and geochemical cycles and feedbacks on Earth's climate, leveraging isotope geochemistry.
- The ecology, physiology and evolutionary history of foraminifera, coccolithophores and radiolarians.

## Grants and Awards

### ERC Consolidator Grant (PI, €1,999,873)

2023-2028

This project PETRARCH "Pinpointing Earth-System Thresholds for Anoxia with new Reconstructions of the Cretaceous Hothouse" will fund two PostDocs, two PhD students, three student helpers and 50% of a technician to explore Cretaceous CO<sub>2</sub> and Ocean Anoxic Events with novel applications of boron isotopes, paired to cGENIE Earth System Modelling. [PI: [Michael Henehan](#)]

### DFG Research Grant (Co-proponent, €204,792)

2022-2025

This grant "STRESS" is advancing the application of laser ablation B isotope and trace element measurements at GFZ to track bleaching events and environmental stress in corals. [PI: [Juan Pablo D'Olivio \(FU Berlin\)](#), Co-Is: [Michael Henehan](#), [Daniel Frick](#)]

### DFG Research Grant (Co-proponent, €243,535)

2022-2025

This grant "EOCENE" applies laser ablation B isotope and trace element measurement at GFZ to examine coping mechanisms of Eocene corals in the face of stress in greenhouse climates. [PI: [Thomas Brachert \(U. Leipzig\)](#), Co-Is: [Michael Henehan](#), [Regina Mertz-Kraus](#)]

### DFG Research Grant (PI, €252,000)

2021-2024

This project, titled "Investigating transient weakening of Earth's silicate weathering 'thermostat' as a possible driver of climate perturbations in the geological past: A middle Eocene case study", funds a PhD student to explore the idea that transient reductions in silicate weathering can drive global warming events, using the MECO as a test case. Investigations will apply Si isotopes in radiolaria and Li isotopes in foraminifera, and integrate them into global carbon cycle models. [PI: [Michael Henehan](#), Co-Is: [Friedhelm von Blanckenburg](#), [Patrick Frings](#), [Don Penman](#)]

### DFG Research Grant (PI, €215,000)

2021-2024

This project, titled "Towards a Mechanistic Model of the Evolution of the Boron Isotope Composition of Seawater", funds a PhD student exploring isotopic fractionation associated with boron and lithium sorption onto clay minerals in different solution chemistries. Data will ground a new model of the boron isotope composition of seawater over the past 150 Myr. [PI: [Michael Henehan](#), Co-I: [Friedhelm von Blanckenburg](#)]

### GFZ Expedition fund (PI, €6,500)

2020

Awarded funds for an expedition to Tanzania to sample mid-Cretaceous sediments for glassy foraminifera (for boron isotopes) and organic geochemistry (TEX86, leaf wax δD, phytane δ<sup>13</sup>C and MBT/CBT). Intended as a seed grant for my ERC Consolidator Grant application (subm. April 2021), but impossible due to CoVID. [PI: [Michael Henehan](#), Co-Is: [Dirk Sachse](#), [Kai Mangelsdorf](#)]

### BIOS Grant-in-aid (Co-proponent \$6,350)

2016

Awarded a seed grant to take 2 Yale researchers to BIOS, Bermuda for 3 weeks. We set up foraminiferal culturing facilities for future proposals, cultured planktic foraminifera for Li isotope and trace metal geochemistry, and forged lasting collaborative relations with PIs such as Amy Maas at BIOS. [Co-Is: [Michael Henehan](#), [Pincelli Hull](#), [Janet Burke](#), [Leanne Elder](#)]

### EU FP7 ASSEMBLE Marine Science Grant (Project author)

2013

Awarded funding to take 4 University of Southampton researchers to the Interuniversity Institute of Eilat, Israel, for 3 weeks. Led culturing of planktic foraminifera to test the environmental controls on δ<sup>11</sup>B and B/Ca ratios in foraminiferal shells. [Project Leader and Author: [Michael Henehan](#), PI: [Gavin Foster](#)]

**2011:** Awarded a **UK-IODP Student Bursary (€1,000)** to attend the ECORD Urbino Summer School in Palaeoclimatology.

**2008:** Awarded a **Nuffield Foundation Student Research Bursary (£1,400)** bursary for a summer research project in palaeoceanographic research at the University of Bristol using IODP sediment core material.

**2007:** Awarded a **BMSS-funded summer studentship** to undertake carbon and oxygen isotope analysis of soil and biological samples via GC-IRMS at IGER (now [North Wyke Research](#)).

**Withdrawn:** Royal Society University Research Fellowship (£680k) withdrawn at final interview stage as unable to hold with ERC.

## **Research Publications (peer reviewed, in chronological order) [n=37, GS citations = 1635 (28.04.24)]**

- Whiteford, Ross, Heaton, Timothy J., **Henehan, Michael J.**, Anagnostou, Eleni, Jurikova, Hana, Foster, Gavin L. and Rae, James W. B. **2024**. *Reconstruction of Cenozoic  $\delta^{11}\text{B}_{\text{sw}}$  Using A Gaussian Process*. Paleoceanography & Paleoclimatology, (accepted).
- Cai, Di, **Henehan, Michael J.**, Uhlir, David, and von Blanckenburg, Friedhelm. **2024**. *Lithium isotopes in water and regolith in a deep weathering profile reveal imbalances in Critical Zone fluxes*. Geochimica et Cosmochimica Acta, 369, 213-226.
- Hönisch, Bärbel, Royer, Dana L., Breecker, Daniel O., Polissar, Pratiqya, Bowen, Gabriel J., **Henehan, Michael J.** et al. **2023**. *Toward a Cenozoic History of Atmospheric CO<sub>2</sub>*. Science, 382(6675), eadi5177.
- Jurikova, Hana, Ring, Simon J., **Henehan, Michael J.**, Neugebauer, Ina, Schröder, Bergit, Müller, Daniela, Schwab, Markus J., Tjallingii, Rik. Brauer, Achim and Blanchet, Cécile. **2023**. *Boron geochemistry reveals the evolution of Dead Sea Brines*. Earth and Planetary Science Letters, 622, 118403.
- Brachert, Thomas, Agnini, Claudia, Gagnaison, C, Gély, J-P., **Henehan, Michael J.** and Westerhold, Thomas. **2023**. *Astronomical Pacing of Middle Eocene Sea-Level Fluctuations: Inferences From Shallow-Water Carbonate Ramp Deposits*. Paleoceanography and Paleoclimatology, 38, e2303PA004633.
- Jones, Heather, Westerhold, Thomas, Birch, Heather, Hull, Pincelli M., Negra, Hédi, Röhl, Ursula, Sepúlveda, Julio, Vellekoop, Johan, Whiteside, Jessica H., Alegret, Laia, **Henehan, Michael J.**, Robinson, Libby, Van Dijk, Joep, and Bralower, Timothy. **2023**. *Stratigraphy of the Cretaceous/Paleogene (K/Pg) boundary at the Global Stratotype Section and Point (GSSP) in El Kef, Tunisia: New insights from the El Kef Coring Project*. GSA Bulletin, 135(9-10), 2451-2477.
- Henehan, Michael J. **2023**. *Silicate weathering feedback hindered by clay formation*. Nature Geoscience, 16(8), 663-664.
- Nambiar, Romi, Hauzer, Hagar, Gray, William R., **Henehan, Michael J.**, Cotton, Laura, Erez, Jonathan, Rosenthal, Yair, Renema, Willem, Müller, Wolfgang and Evans, David. **2023**. *Controls on potassium incorporation into foraminiferal and other marine calcifying organisms*. Geochimica et Cosmochimica Acta, 351, 125-138.
- Henehan, Michael J. and Witts, James D. **2023**. *Continental flood basalts do not drive later Phanerozoic extinctions*. Proceedings of the National Academy of Sciences, 120(21), e2303700120.
- Gray, William R., Evans, David, **Henehan, Michael J.**, Weldeab, Syce, Lea, David W., Müller, Wolfgang, and Rosenthal, Yair. **2023**. *Sodium incorporation into foraminiferal calcite: An evaluation of the Na/Ca salinity proxy and evidence for multiple Na-bearing phases*. Geochimica et Cosmochimica Acta, 348, 152-164.
- Judd, Emily, 18 others, **Henehan, Michael J.**, et al. **2022**. *The PhanSST global database of Phanerozoic sea surface temperature proxy data*. Scientific Data, 9(1), 753.
- Chapela Lara, María, Buss, Heather L., **Henehan, Michael J.**, Schuessler, Jan A. and McDowell, William H. **2022**. *Secondary minerals drive extreme lithium isotope fractionation during tropical weathering*. J. Geophys. Res.: Earth Surface, 127(2), e2021JF006366.
- Cai, Di, **Henehan, Michael J.**, Uhlir, David, and von Blanckenburg, Friedhelm. **2022**. *Mg isotope composition of runoff is buffered by the regolith exchangeable pool*. Geochimica et Cosmochimica Acta, 321, 99-114.
- Henehan, Michael J.**, Klein Gebbinck, Christa D., Wyman, Jillian V. B., Hain, Mathis P., Rae, James W. B., Hönisch, Bärbel, Foster, Gavin L. and Kim, Sang-Tae. **2022**. *No ion is an island: Multiple ions influence boron incorporation into CaCO<sub>3</sub>*. Geochimica et Cosmochimica Acta, 318, 510-530.
- Golla, Jon K., Küßner, Marie L., **Henehan, Michael J.**, Bouchez, Julien, Rempe, Daniella M. and Druhan, Jennifer L. **2021**. *The evolution of lithium isotope signatures in fluids draining actively weathering hillslopes*. Earth and Planetary Science Letters, 567, 116988.
- Zhang, Xu Yvon, Saldi, Giuseppe D., Schott, Jacques, Bouchez, Julien, Kuessner, Marie, Montouillout, Valérie, **Henehan, Michael J.**, and Gaillardet, Jérôme. **2021**. *Experimental constraints on Li isotope fractionation during the interaction between detrital material and seawater*. Geochimica et Cosmochimica Acta, 292, 333-347.
- Stewart, Joseph A., Day, Russell D., Christopher, Steven J., Kucklick, John R., Bordier, Louise, Chalk, Thomas B., Dapoigny, Arnaud, Douville, Eric, Foster, Gavin L., Gray, William R., Greenop, Rosanna, Gutjahr, Marcus, Hemsing, Freya, **Henehan, Michael J.** & 10 others. **2020**. *New Carbonate Reference Material for Boron Isotope and Trace Element Geochemistry: NIST RM8301 Boron Isotopes in Marine Carbonate (Simulated Coral and Foraminifera Solutions) Inter-laboratory Comparison Exercise*. Geostandards & Geoanalytical Res., 45(1), 77-96.
- Barnet, James S. K., Harper, Dustin T., LeVay, Leah J., Edgar, Kirsty M., **Henehan, Michael J.**, Babila, Tali L., Ullmann, Clemens V., Leng, Melanie J., Kroon, Dick, Zachos, James C. and Littler, Kate. **2020**. *Coupled evolution of temperature and carbonate chemistry during the Paleocene–Eocene; new trace element records from the low latitude Indian Ocean*. Earth and Planetary Science Letters, 545, 116414.
- Hull, Pincelli M., Bornemann, André, Penman, Donald E., **Henehan, Michael J.** and 33 others. **2020**. *On impact and volcanism across the Cretaceous-Paleogene boundary*. Science, 367(6475), 266-272.
- Henehan, Michael J.**, Edgar, Kirsty M., Foster, Gavin L., Penman, Donald E., Hull, Pincelli M., Greenop, Rosanna, Anagnostou, Eleni and Pearson, Paul N. **2020**. *Revisiting the Middle Eocene Climatic Optimum ‘Carbon Cycle Conundrum’ with new estimates of atmospheric pCO<sub>2</sub> from boron isotopes*. Paleoceanography and Paleoclimatology, 35(6), e2019PA003713.
- Henehan, Michael J.**, Ridgwell, Andy, Thomas, Ellen, Zhang, Shuang, Alegret, Laia, Schmidt, Daniela N., Rae, James W. B., Witts, James D., Landman, Neil H., Greene, Sarah E., Huber, Brian T., Super, James, Planavsky, Noah, and Hull, Pincelli M. **2019**. *Rapid ocean acidification and phased biogeochemical recovery following the end-Cretaceous Chicxulub impact*. Proceedings of the National Academy of Sciences, 116 (45), 22500-22504.

Tatzel, Michael, Vogl, Jochen, Rosner, Martin, **Henehan, Michael J.**, and Tüiken, Thomas. 2019. *Triple Isotope Fractionation Exponents of Elements Measured by MC-ICP-MS—An Example of Mg*. *Analytical Chemistry*, 91(22), 14314-14322.

Hsiang, Allison Y., Brombacher, Anieke, Costa Rillo, Marina, Mleneck-Vautravets, Maryline J., Conn, Stephen, Lordsmith, Sian, Jentzen, Anna, **Henehan, Michael J.** and 15 others. 2019. *Endless Forams: >34,000 modern planktonic foraminiferal images for taxonomic training and automated species recognition using convolutional neural networks*. *Paleoceanography and Paleoclimatology*, 34(7), 1157-1177.

Greenop, Rosanna, Sosdian, Sindia, **Henehan, Michael J.**, Wilson, Paul A., Lear, Caroline H. and Foster, Gavin L. 2019. *Orbital forcing, ice-volume and CO<sub>2</sub> across the Oligocene-Miocene Transition*. *Paleoceanography and Paleoclimatology*, 34(3), 316-328

Burke, Janet E., Renema, Willem, **Henehan, Michael J.**, Elder, Leanne E., Davis, Catherine V., Maas, Amy E., Foster, Gavin L., Schiebel, Ralf and Hull, Pincelli M. 2018. *Factors Influencing Porosity in Planktonic Foraminifera*. *Biogeosciences*, 15(21), 6607-6619.

Evans, David, Badger, Marcus P. S., Foster, Gavin L., **Henehan, Michael J.**, Lear, Caroline H. and Zachos, James C. 2018. *No substantial long-term bias in the Cenozoic benthic foraminifera oxygen-isotope record*. *Nature Communications*, 9, 2875.

**Henehan, Michael J.**, Evans, David, Shankle, Madison, Burke, Jana E., Foster, Gavin L., Anagnostou, Eleni, Chalk, Thomas B., Stewart, Joseph A., Alt, Claudia S., Durrant, Joseph and Hull, Pincelli M. 2017. *Size-dependent response of foraminiferal calcification to seawater carbonate chemistry*. *Biogeosciences*, 14, 3287-3308.

Zhang, Shuang, **Henehan, Michael J.**, Hull, Pincelli M., Reid, R. Pamela, Hardisty, Dalton S., Hood, Ashleigh and Planavsky, Noah J. 2017. *On the reliability of ocean pH estimates derived from boron isotopes in shallow marine inorganic carbonates*. *Earth and Planetary Science Letters*, 458, 380-393.

Wang, Xiangli, Planavsky, Noah J., Hull, Pincelli M., Tripathi, Aradhna, Zou, Huijuan, Elder, Leanne and **Henehan, Michael J.** 2017. *Assessing the utility of foraminifera as an archive of seawater  $\delta^{53}\text{Cr}$* . *Geobiology*, 15 (1), 51-64.

**Henehan, Michael J.**, Foster, Gavin L., Bostock, Helen C., Greenop, Rosanna, Marshall, Brittney J., and Wilson, Paul A. 2016. *A new boron isotope-pH calibration for *Orbulina universa*, with implications for understanding and accounting for 'vital effects'*. *Earth and Planetary Science Letters*, 454, 282-292.

**Henehan, Michael J.**, Hull, Pincelli M., Penman, Donald E., Rae, James W. B and Schmidt, Daniela N. 2016. *Biogeochemical Significance of Pelagic Ecosystem Function: An end-Cretaceous Case Study*. *Philosophical Transactions of the Royal Society B*, 371: 20150510.

Evans, David, Wade, Bridget S., **Henehan, Michael J.**, Erez, Jonathan and Müller, Wolfgang. 2016. *Revisiting carbonate chemistry controls on planktic foraminifera Mg/Ca: Implications for sea surface temperature and hydrology shifts over the Paleocene-Eocene Thermal Maximum and Eocene-Oligocene Transition*. *Climate of the Past*, 12, 819-835.

Martínez-Botí, Miguel -A., Marino, Gianluca, Foster, Gavin L., Ziveri, Patrizia, **Henehan, Michael J.**, Mortyn, P. Graham, and Vance, Derek, 2015. *The role of the ocean in deglacial atmospheric CO<sub>2</sub> rise*. *Nature*, 518 (7538) 219-222.

**Henehan, Michael J.**, Foster, Gavin L., Rae, James W.B., Bostock, Helen C., Marshall, Brittney J., Erez, Jonathan, Kucera, Michal, and Wilson, Paul A., 2015 *Evaluating the utility of B/Ca ratios in planktic foraminifera as a proxy for the carbonate system: A case study of *Globigerinoides ruber**. *Geochemistry, Geophysics, Geosystems* 16 (4), 1052-1069.

Marshall, Brittney J., Thunell, Robert C., Spero, Howard J. **Henehan, Michael J.** and Astor, Yrene. 2015. *Morphometric and stable isotopic differentiation in *Orbulina universa* morphotypes from the Cariaco Basin, Venezuela*. *Marine Micropalaeontology* 120, 46-64.

**Henehan, Michael J.**, Rae, James W.B., Foster, Gavin L., Erez, Jonathan, Prentice, Katherine C., Kucera, Michal, Bostock, Helen C., Martínez-Botí, Miguel A., Milton, J. Andy, Wilson, Paul A., Marshall, Brittney J. and Elliott, Tim. 2013. *Calibration of the boron isotope proxy in the planktonic foraminifera *Globigerinoides ruber* for use in palaeo-CO<sub>2</sub> reconstruction*. *Earth and Planetary Science Letters*, 364, 111-122.

Marshall, Brittney J., Thunell, Robert C., **Henehan, Michael J.**, Astor, Yrene & Wejnert, Katherine 2013. *Planktonic foraminiferal area density as a proxy for carbonate ion concentration: A calibration study using the Cariaco Basin Ocean Time Series*. *Paleoceanography*, 28(2), 363-376.

## **Other publications**

Raitzsch, M., Hain, M. P., **Henehan, M. J.** & Gattuso, J.-P. 2021. *seacarb<sub>x</sub> - seacarb extension for deep-time carbonate system calculations* (R package). <http://doi.org/10.5281/zenodo.4432170>.

**Henehan, M. J.** & Jurikova, H. 2019. *Boron in CaCO<sub>3</sub> as a record of past seawater carbonate chemistry*. *PAGES Magazine*, 27(2), 58-59.

## **Community Contributions**

- **Reviewer** for *Science*, *Proceedings of the National Academy of Sciences*, *Geology*, *Nature Geoscience*, *Nature Scientific Reports*, *Geochimica et Cosmochimica Acta*, *Paleoceanography* (& *Paleoclimatology*), *Earth and Planetary Science Letters*, *Chemical Geology*, *Geophysical Research Letters*, *Marine Micropalaeontology*, *Mass Spectrometry Reviews*, *Palaeo*<sup>3</sup>, *Geoscientific Model Development*, *Biogeosciences*, *Global and Planetary Change*, *GSA Books*, *Marine Chemistry*.
- **Associate Editor**, *Paleoceanography and Paleoclimatology*
- **Proposal reviewer** for NSF (USA), Natural Environmental Research Council (UK), the Royal Society (UK), the Royal Society of New Zealand, French National Research Agency and Narodowe Centrum Nauki (Poland) and SNSF (Switzerland).
- **Named collaborator** on the *SWEET* (Super-Warm Early Eocene Temperatures and climate: understanding the response of the Earth system to high CO<sub>2</sub> through integrated modelling and data) NERC large grant ([www.deepmip.org/sweet](http://www.deepmip.org/sweet))
- **Active member** of the NSF and Heising-Simons Foundation Research Coordination Network “*Improving Reconstructions of Cenozoic pCO<sub>2</sub> change*” ([www.paleo-CO2.org](http://www.paleo-CO2.org)), currently building a community-curated multiproxy database of Phanerozoic pCO<sub>2</sub>.

**Convenor:** B Isotope workshop, ICP Bergen, 2022; vEGU Session “*Advances in geochemical proxy development and application*”, 2021; AGU Fall Meeting Session “*Global Climate Events and Ocean Chemistry of the Palaeogene and K-Pg Transition*”, 2014.

**Invited Speaker:** International Conference of Palaeoceanography 2022 Bergen, Lamont-Doherty Earth Observatory, University of Cambridge, University of Oxford, University of Tübingen, Yale University, NIWA, Cardiff University, University of Oviedo, University of Birmingham, University of Southampton, University of Bristol, BIOS, Max Planck Institute for Solar System Research in Göttingen, Goethe University Frankfurt, Laboratoire d’Oceanographie de Villefranche & the Interuniversity Institute of Eilat, Israel.  
**PhD Examination Committees:** James Kershaw (Uni. Bristol), Tjördis Störling (Lund Uni.)  
**Committees:** Geochemistry Group rep & EDI committee liaison, UoB Earth Science Research Committee (2023-present)

## Research Experience

### **Lecturer, University of Bristol**

**January 2023 - Present**

I work at the interface of the MATES (Marine and Terrestrial Environments), Geochemistry and Palaeobiology Groups within the School of Earth Sciences, Uni. of Bristol. Currently much of my research relates to my €2M ERC (now UKRI-guaranteed) Consolidator Grant PETRARCH (*Pinpointing Earth System Thresholds for Anoxia with New Reconstructions of the Cretaceous Hothouse*), with a technician, PostDoc and PhD student currently working in my team, and another PostDoc and PhD student still to join.

### **Research Scientist, GFZ Potsdam**

**August 2017-December 2022 (PI: Prof. Dr. Friedhelm von Blanckenburg)**

Worked within the *Earth Surface Geochemistry* group on the interaction between CO<sub>2</sub>, climate, biota and the Earth surface. Responsible for HELGES trace metal clean laboratory and supervising associated technical staff and visiting researchers. Secured almost €2.5M in funding, and set up the methodology to generate high-precision B and Li isotope data on minute sample quantities. Projects included reconstructing pCO<sub>2</sub> and carbon cycling in the Paleocene, investigating Mg and Li cycling in the Critical Zone, the trace metal and isotope geochemistry of radiolaria, the development of laser ablation B isotope analysis in carbonates, using Fe isotopes to track accelerated weathering by fungi and using Nd and B isotopes to track Holocene precipitation in the Levant.

### **Post-Doctoral Research Associate, Yale University**

**April 2014 - August 2017 (PI: Dr. Pincelli Hull)**

During 3.5 years at Yale, my main focus was investigating carbon cycle perturbations around the Cretaceous-Palaeogene (K-Pg) boundary. I set up the required methodology for high-quality boron isotope measurements at Yale, and generated records of δ<sup>11</sup>B in fossil foraminifera across the K-Pg, published in *PNAS* in 2019.

### **Post-Doctoral Research Associate, University of Southampton**

**August 2013 - February 2014 (PI: Dr. Gavin Foster)**

Over a 6-month post-doc I led an ERC-funded foraminiferal culturing expedition to Eilat, Israel, and generated boron isotope and trace elements proxy records over the MECO (Middle-Eocene Climatic Optimum), which I later coupled with carbon cycle modelling at Yale, and published last year in *Paleoceanography & Paleoclimatology*.

## Teaching and Outreach Experience

### **University of Bristol**

**2023 - Present**

- Unit Co-Ordinator and sole lecturer, ‘Oceans and Climates’ (3<sup>rd</sup> year undergraduate, 20 CP)
- 2<sup>nd</sup> Marker, 3<sup>rd</sup> year Environmental Geoscience Research Projects.
- 2<sup>nd</sup> and 3<sup>rd</sup> year Tutorials

### **GFZ Potsdam**

**2017 - 2022**

- Annual summer course ‘Metal Isotope Geochemistry’ (through the Freie Universität Berlin), taught with Friedhelm von Blanckenburg and Daniel Frick, covering *ab initio* theory, measurement hardware, uncertainty quantification, practical applications, and a hands-on Fe isotope measurement exercise.
- Contributed to the Masters-level course ‘Palaeoindicators of climate and environmental change in marine calcifiers’ at FU Berlin (course coordinator Juan Pablo D’Olivo, lecturing on the evolutionary history, physiology and practical applications of foraminifera.

### **Yale University**

**2014 - 2017**

- Lectured on Greenhouse and Icehouse Climates, and their relevance to macroevolutionary history, as part of the undergraduate ‘History of Life’ course, led by Pincelli Hull and Lidya Tarhan.
- Lectured on boron isotopes as part of the mixed undergraduate/graduate ‘Paleoenvironments’ course, led by Noah Planavsky.
- Co-taught in the graduate level course ‘Advanced Critiques of Paleoclimatographic Methodologies’ for Mark Pagani.

### **Bestival Science Tent and Bestiversity**

**2011 - 2013**

- At Bestival Music Festival (Isle of Wight, UK) I lectured to festival-goers on the science behind climate change, and co-ordinated and staffed the National Oceanography Centre’s interactive exhibits in the Science tent. The science tent continues to exhibit at this and other festivals in the UK, including Glastonbury Music Festival and the Cheltenham Science Festival.

### **Teaching Assistant, University of Southampton**

**2010 - 2012**

- Helped teach practical classes in Geochemistry, Maths, and Palaeobiology (the latter including two field trips).

**Outreach:** I have delivered many talks on climate science to diverse public audiences in the US, UK and Ireland. At Yale, I participated in the Climate Voices initiative, pairing climate scientists with local schools and community organisations. I contribute to Climate Feedback, which fact-checks coverage of climate science in the media ([climatefeedback.org](http://climatefeedback.org)). I have given numerous newspaper, magazine, radio and television interviews about my research, which have featured in the Guardian, the Atlantic, the New York Times, Der Spiegel among others, as well as national TV and radio in Germany, Switzerland and Malaysia.

## **Student Mentoring**

I currently supervise two DFG-funded PhD students based at GFZ Potsdam/FU Berlin (*Simon Ring & Ruchi* - see 'Grants and Awards'), and one UKRI-funded PhD student at Bristol (Bernát Heszler) funded through the PETRARCH project. I co-supervise one PhD student at FU Berlin, and one at Uni. Leipzig, both applying laser ablation boron isotope measurements to fossil corals. In addition I currently supervise or co-supervise three MSc/MSci students at the University of Bristol, on late Cretaceous foraminiferal vital effects, and on the palaeoconographic signal of the Messinian Salinity Crisis in the Eastern Mediterranean. At GFZ I co-supervised *Di Cai*, looking at cycling and fractionation of Li and Mg isotopes in the Critical Zone (two publications in *GCA*, now postdoc in Tongji University). I also supervised two BSc dissertations on K-Pg foraminiferal fragmentation and radiolarian geochemistry. At Yale, I co-supervised five undergraduate and graduate student research projects: investigating controls on foraminiferal shell weight (output published in *Biogeosciences*), developing foraminiferal fragmentation as a proxy (manuscript in prep.), assessing foraminiferal diversity and disparity in the run up to the K-Pg Boundary (student presented a poster at AGU), applying paired Li and B isotope measurements in foraminifera (manuscript in prep.) and applying boron isotopes to shallow marine CaCO<sub>3</sub> (output published in *EPSL*). At Southampton, I supervised a Masters project investigating controls on foraminiferal shell weight (feeding into a paper in *Biogeosciences*).

## **Professional/Academic Development**

**Courses attended:** *Postgraduate Certificate in Academic Practice* (U. Bristol, 2023-2024), *Helmholtz Leadership Academy* (U. Bristol, 2022), *Leadership & Career Development Skills for PostDocs* (GFZ Potsdam, 2020), *PALEOGENiE / ECOGEM modelling summer school* (U. Bristol, 2016), *Storytelling in Science* (U. Southampton, 2013), *Communicating Climate Change* (Union of Concerned Scientists, 2012), *NERC Life & the Planet Spring School* (NERC, 2012), *Nuts & Bolts of Mass Spectrometry Short Course* (EAG, U. Bristol, 2012), *Urbino Summer School in Palaeoclimatology* (ECORD/NSF, U. Urbino, 2011), *Media Handling Skills* (U. Southampton, 2011), *Postgraduate Introduction to Learning & Teaching* (U. Southampton, 2010).

### **Professional Affiliations:**

*European Assoc. of Geochemistry, EGU, The Micropalaeontological Soc., The Cushman Foundation, Deutsche Mineralogische Gesellschaft*