Brendan T. McCormick Kilbride | Curriculum Vitae

Presidential Fellow, Department of Earth and Environmental Sciences, University of Manchester
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Primary Research Interests

Volcanic gas emissions, satellite remote sensing, gas geochemistry, volatile cycling in subduction zones, volcano monitoring, natural hazards, volcanic risk, noble gas isotope geochemistry.

Academic Appointments

2019-present Presidential Fellow (Academic), University of Manchester (*tenure track*)

2018-2019 Postdoctoral Research Associate, Queens' College, University of Cambridge

2016-2019 Research Associate, Department of Earth Sciences, University of Cambridge

2015 Research Associate, Department of Geography, University of Cambridge
Visiting Scientist, Department of Earth Sciences, University of Cambridge

2013-2014 Fellow of the Global Volcanism Program, Smithsonian Institution (NMNH)

Education

2009-2014 Ph.D., Volcanology, Dept. Earth Sciences, University of Cambridge
Thesis: *Measuring volcanic sulfur dioxide emissions with the satellite-based Ozone Monitoring Instrument;* Supervisors: Marie Edmonds, Tamsin Mather, Simon Carn

2005-2009 M.Sci. Earth Sciences, Dept. Earth Sciences, University of Oxford, 1st Class Hons.
Thesis: *A geochemical investigation into the post-emissions behaviour of volcanogenic mercury*; Supervisors: Tamsin Mather, Melanie Witt, Murray Gardner

Honours and Awards

2019 William Smith Fund, Geological Society of London
for volcanological research and capacity building efforts in Papua New Guinea

2015 Editor's Citation for Excellence in Refereeing, AGU Journals
awarded for reviewer contributions to Journal of Geophysical Research: Atmospheres

2014 Bradley Prize, Geological Society of Washington
for the best scientific paper presented in 2014

2008 Paleontological Association Prize, Department of Earth Sciences, University of Oxford
for the best performance in BA year paleontology examinations

Fieldwork Experience

2019 *Expedition Leader.* Drone- and ground-based studies of volcanic gases, Bagana volcano (PNG). Drone- and ground-based measurements, sample collection of volcanic gases, Rabaul volcano (PNG).

2018 *Expedition Co-Leader.* Installation of MultiGas monitoring instrument, Rabaul volcano (PNG); Recon. expedition to Manam Island including drone-based and remote sensing study of gas emissions.

2016 *Expedition Leader.* Measurement and sampling of gas emissions at Rabaul, Ulawun, Bagana, Garbuna volcanoes (PNG), drone photogrammetry and lava and ash sampling.

2015 Gas emissions monitoring and sampling at Stromboli (Italy).

Volcanic gas / air quality measurements at Holuhraun lava flow field, Bardarbunga volcano (Iceland).

2014 Remote sensing of volcanic emissions, Lastarria & Lascar volcanoes (Chile).

2013 Soil gas emissions survey, accumulation chamber method at Campi Flegrei caldera (Naples, Italy).

2012 Soil gas emissions survey, accumulation chamber method, Santorini (Greece).

Teaching and Mentoring Experience

Lecturing

As of academic year 2020/21, I contribute two lectures to the final year "Volcanology" module of the BSc Geology degree at the University of Manchester, and two further introductory lectures for the final year "Active volcanoes of Italy" field course. From 2015-2019, I gave two lectures to final year Cambridge BA Geography students in the "Topics in Volcanology" module.

Lab demonstrating

I contribute two computer-based practical to the final year "Volcanology" module of the BSC Geology degree at Manchester as well as a first year class on volcanic risk in urban areas. In 2015-18, I developed coding-led computer-based practicals for the "Topics in Volcanology" course of the Cambridge BA Geography degree. I have >200 hours experience of practical class teaching for the Earth Sciences MSc at Cambridge (microscopy, crystallography, interpretation of geological maps, petrography, geochemistry).

Tutorial teaching

I have >300 hours experience of small class (1-3 students) teaching for the Cambridge BA Geography course (1st, 2nd, 3rd year students). Topics cover structure and formation of Earth; volcano-tectonic forcing of climate; natural hazards and disaster risk reduction; physical and chemical processes in volcanology; volcano monitoring and hazard management. I have >40 hours experience of tutorial teaching for Cambridge MSc Earth Sciences course (igneous and metamorphic petrology, practical optical microscopy).

Field teaching

I have taught on six undergraduate field courses (UK), and been a driver on three. I co-led a virtual fieldtrip on Italian volcanism during the 2020 COVID-19 lockdown.

Mentoring & Supervision

I am the nominated internal examiner for a second-year doctoral student (Ms Marissa Lo)'s transfer report at the University of Manchester. I co-supervised of a Cambridge MSc thesis (2012/13, Dr Lois Salem) and was principal supervisor of a Smithsonian Institution summer intern (2013, Mr Oscar Lopez). As convenor of the Cambridge Volcanology seminar series, I invited 50% Early Career speakers (of which 50% external to Cambridge), gave detailed presentation feedback, and facilitated speakers' meetings with senior colleagues.

Grant Funding Awarded

2020 UoM GCRF-QR fund, *internal funding call*, (as PI), £10,580
Developing near-real-time satellite monitoring of volcanoes in Papua New Guinea

2019 DCO-DECADE fieldwork fund (as PI), £19,970
Drone-based measurements of gas chemistry at Bagana volcano, Papua New Guinea

2018 GCRF Global Impact Acceleration Account (as Co-I, PI E. Liu), £29,960
Building capacity through knowledge exchange: using drones for volcano monitoring
Geological Society of London, Elspeth Matthews Fund (as PI), £1260
A geochemical survey of volcanic unrest at Rabaul caldera, Papua New Guinea
Alfred P. Sloan Foundation trustee grant (via DCO, as Co-I, PI E.J. Liu), $215,000
Aerial Observations of Volcanic Emissions from Unmanned Aerial Systems

2017 DCO-DECADE instrumentation fund (as Co-I / Fieldwork Lead; PI A. Aiuppa), €15,000
Deployment of MultiGAS monitoring instrument at Rabaul caldera, Papua New Guinea
Geological Society of London, Elspeth Matthews Fund, (as PI), £1560
Understanding the coupling between gas emissions and lava extrusion at Bagana volcano

2015 DCO-DECADE Fieldwork fund (as Co-I / Fieldwork Lead; PI M. Edmonds), $23,000
NERC-COMET Small Grant fund, (as PI / Fieldwork Lead), £5000

2014 Deep Carbon Observatory (DCO) Early Career Travel Fund, $3000
12th Field Workshop on Chemistry of Volcanic Gases, Atacama, Chile

2013 Postdoctoral Fellowship of the Global Volcanism Program, $125,000
co-funded by the Deep Carbon Observatory / Alfred P. Sloan Foundation

Public Service and Professional Activities

Committee Membership

I served on the scientific programme committee for "Deep Carbon 2019: Launching the Next Decade of Deep Carbon", an international conference held in Washington, DC, in October 2019. I am a Science Officer for the Geochemistry, Mineralogy, Petrology & Volcanology division of the European Geosciences Union, with responsibility for contributing division strategy and soliciting session proposals and award nominations. I serve on the Steering Committee of Centre for Crisis Studies and Mitigation, a new interdisciplinary body at the University of Manchester.

Seminar Convening

I am the principal convenor of the Geoscience research group seminar at the University of Manchester. From 2015-19 I was the lead convenor of the Cambridge Volcanology seminar series, comprising 15-20 term-time talks per academic year. The seminar brought together academics and students across the Departments of Earth Sciences, Geography, Atmospheric Chemistry, and Medicine.

Referee

I have provided expert peer review for manuscripts submitted to: Science; Scientific Reports; Bulletin of Volcanology; Geosciences; Geophysical Research Letters; Atmospheric Chemistry & Physics; Journal of Geophysical Research: Atmospheres; Geochemistry, Geophysics, Geosystems; Frontiers in Earth Sciences. I was awarded an Editor's Citation by AGU for excellence in peer reviewing. I have been a solicited reviewer for the United States NSF-Postdoctoral Fellowship scheme and the New Zealand Marsden Fund Postdoctoral Fellowship program.

Outreach

I recently collaborated with a media organisation, Twig Education Ltd, to produce four short films about active volcanoes intended for broadcast in high schools worldwide (initially United States and China). I shot footage during fieldwork to Papua New Guinea, gave interviews and reviewed the rough and final edits of Twig's films. In 2015-16 I acted as a consultant reviewer for several volcano documentaries produced for Smithsonian TV. I have given public lectures in the Cambridge area for Pint of Science, the British Science Association, the Friends of the Sedgwick Museum and the Cambridge Geological Society. In 2013 I led the Volcanic Ash Hazard stand at the Smithsonian Institution "Become a Pilot" Day held at the National Air and Space Museum, Dulles. I maintain an active presence on Twitter and in 2014 curated the @RealScientists account for a week, discussing my research and the work of the Smithsonian Global Volcanism Program [http://realscientists.org/2014/11/30/lava-man-brendan-mccormick-joins-real-scientists/].

Professional Membership

I am a member of the American Geophysical Union, the European Geosciences Union, the Geological Societies of London and Washington, the UK Volcanic & Magmatic Studies Group and the International Association of Volcanology & Chemistry of Earth's Interior.

Invited Talks

2020 First measurements of gas chemistry at Bagana volcano, Papua New Guinea
Department of Earth and Environmental Sciences, University of Manchester
Long-range drone measurements of volcanic gas chemistry at Bagana volcano, PNG
Department of Geography, University of Sheffield

2019 *Assessing and mitigating for volcanic risk in the Bismarck arc, Papua New Guinea*,
Centre for Research in the Arts, Social Sciences & Humanities, University of Cambridge

2018 *The volatile volcanoes of Papua New Guinea*
Department of Earth Sciences, University of Oxford

2017 *Reservoirs and Fluxes of Deep Carbon*
Deep Carbon Obsevatory / Indian Geophysical Union Congress, University of Hyderabad
Integrated satellite observations of volcanic eruptions
Istituto Nazionale di Geofisica e Vulcanologia, Palermo

2014 *Ten Years of Satellite Observations Reveal Highly Variable Degassing at Anatahan Volcano*
Geological Society of Washington, 1486th Meeting

2013 *Satellite observations of volcanic degassing*
Geophysical Laboratory, Carnegie Institute of Washington

Workshops and Courses

2020 Narrative and storytelling in communicating volcanic risk, VMSG Plymouth

2019 1st Meeting of the UK Volcanic Gas Studies community (*co-convenor*)

2018 DCO Catastrophic Perturbations to Earth's Deep Carbon Cycle, Reykavik (*co-convenor*)

Tectonic reconstructions of the Deep Carbon Cycle, Queens' College, Cambridge

2016 Etna Geochemistry Training School: Science Meets Practice, Etna, Sicily

2015 COMET: Multi-disciplinary modelling of magmatic processes, University of Leeds, UK

3rd MeMoVolc Summer School: From crustal storage to eruption triggering, Santorini.

2014 IAVCEI Commission for Chemistry of Volcanic Gases, 12th Field Workshop, Atacama, Chile

Deep Carbon Observatory Data Science Day, Rensselaer Polytechnic Institute, USA

2013 EarthCube: new Cyberinfrastructure Vision for Petrology & Geochemistry, SI-NMNH

Publications

(i) Peer-reviewed papers

Liu, E.J., A. Aiuppa, A. Alan, S. Arellano, M. Bitetto, N. Bobrowski, S. Carn, R. Clarke, E. Corrales, J.M. de Moor, J.A. Diaz, M. Edmonds, T.P. Fischer, J. Freer, G.M. Fricke, B. Galle, G. Gerdes, G. Giudice, A. Gutmann, C.S.L Hayer, I. Itikarai, J. Jones, E. Mason, **B.T. McCormick Kilbride**, K. Mulina, S. Nowicki, K. Rahilly, T. Richardson, J. Rüdiger, C.I. Schipper, I.M. Watson, K. Wood, Aerial strategies advance volcanic gas measurements at inaccessible, strongly degassing volcanoes, *Science Advances*, 6 (44), eabb9103.

McCormick Kilbride, B.T., K. Mulina, G. Wadge, R.W. Johnson, I. Itikarai, M. Edmonds. 2019. Multiyear satellite observations of sulfur dioxide gas emissions and lava extrusion at Bagana volcano, Papua New Guinea . *Frontiers in Earth Science, 7 (9).*

D'Aleo, R., M. Bitetto, D. Delle Donne, M. Coltelli, D. Coppola, **B.T. McCormick Kilbride**, E. Pecora, M. Ripepe, L. Salem, G. Tamburello, A. Aiuppa, 2019. Understanding the SO2 Degassing Budget of Mt Etna's Paroxysms: First Clues From the December 2015 Sequence. *Frontiers in Earth Sci., 8 (239).*

Furtney, M.A., M.E. Pritchard, S.A. Carn, S.K. Ebmeier, J.A. Jay, **B.T. McCormick Kilbride**, K.A. Reath, 2018. Synthesizing multi-sensor, multi-satellite, multi-decadal data sets for global volcano monitoring. *J. Volcanol. Geotherm. Res., 365.*

Taylor, I.A., J. Preston, E. Carboni, T.A. Mather, R.G. Grainger, N. Theys, S. Hidalgo and **B.T. McCormick Kilbride**, 2018. Exploring the utility of IASI for monitoring volcanic SO2 emissions. J. Geo. Res. Atmos., 123.

Hamlyn, J., T.J. Wright, R.J. Walters, C. Pagli, E. Sansosti, F. Casu, S. Pepe, M. Edmonds, **B.T. McCormick Kilbride**, D. Keir, J. Neuberg, C. Oppenheimer. What causes subsidence following the 2011 eruption at Nabro (Eritrea)? 2018. Progress in Earth and Planetary Science, 5.

Wadge, G., **B.T. McCormick Kilbride**, M. Edmonds, R.W. Johnson. Persistent growth of a new andesite lava cone: Bagana volcano, Papua New Guinea, 2018. J. Volcano. Geotherm. Res., 356.

Ilyinskaya, E., A. Schmidt, T.A. Mather, F.D. Pope, C. Witham, P. Baxter, T. Jóhansson, M. Pfeffer, S. Barsotti, A. Singh, P. Sanderson, B. Bergsson, **B. McCormick Kilbride**, A. Donovan, N. Peters, C. Oppenheimer, M. Edmonds, 2017. Understanding the environmental impacts of large fissure eruptions: aerosol and gas emissions from the 2014-2015 Holuhraun eruption (Iceland). Earth and Planetary Science Letters, 472.

McCormick Kilbride, B.T., M. Edmonds and J. Biggs, 2016. Observing eruptions of gas-rich compressible magmas from space. Nature Communications, 7.

McCormick, B.T., C. Popp, B. Andrews, E. Cottrell, 2015. Ten years of satellite observations reveal highly variable sulfur dioxide emissions from Anatahan volcano, Mariana Islands. Journal of Geophysical Research: Atmospheres, 120.

McCormick, B.T., M. Herzog, J. Yang, M. Edmonds, T.A. Mather, S.A. Carn, S. Hidalgo and B. Langman, 2014. A comparison of satellite- and ground-based measurements of SO2 emissions from Tungurahua volcano, Ecuador. Journal of Geophysical Research: Atmospheres, 119.

McCormick, B.T., M. Edmonds, T.A. Mather, R. Campion. C.S.L. Hayer, H. Thomas and S.A. Carn, 2013. Volcano monitoring applications of the Ozone Monitoring Instrument. Geological Society of London Special Publications, 380.

McCormick, B.T., M. Edmonds, T.A. Mather and S.A. Carn, 2012. First synoptic analysis of volcanic degassing in Papua New Guinea. Geochem., Geophys., Geosys., 13.

(ii) Manuscripts under consideration, in preparation

McCormick Kilbride, B.T., E.J. Liu, K.T. Wood, T.C. Wilkes, C.I. Schipper, K. Mulina, T. Richardson, C. Werner, C.S.L. Hayer, A. Aiuppa, M. Bitetto, G. Giudice, T.D. Pering, A.J.S McGonigle, I. Itikarai, First measurements of volcanic gas chemistry at Bagana volcano, Papua New Guinea [*intended for submission December 2020, G-Cubed*]

McCormick Kilbride, B.T., B.S. Ellis, I. Buisman, G. Nicoli, Z. Vukmanovic, R.W. Johnson, M. Edmonds, Petrographic and chemical insights into pre-eruptive processes at Bagana volcano, Papua New Guinea [*intended for submission December 2020, J. Volcanology & Geothermal Research*]

Liu, E.J., K. Wood, A. Aiuppa, M. Bitetto, G. Giudice, T. Fischer, **B.T. McCormick Kilbride**, T. Plank, T. Hart, Volcanic activity and gas emissions along the South Sandwich arc [*in revision, Bulletin of Volcanology*]

McCormick Kilbride, B.T., T. Fischer, P.H. Barry, R. Burgess, G. Holland, A.Aiuppa, M. Edmonds, E.J. Liu. Fumarole and hot spring geochemistry at Rabaul, a restless caldera volcano in Papua New Guinea. [*laboratory analyses paused due to COVID-19 lockdown restrictions, intended submission summer 2021*]

Vukmanovic, Z. & **B.T. McCormick Kilbride**, EBSD measurements of igneous phenocrysts reveal deep deformation processes in magmatic plumbing systems [*laboratory analyses paused due to COVID-19 lockdown restrictions, intended submission spring 2021*]

(iii) Other publications

McCormick Kilbride, B.T., Dance on a Volcano: Bagana, Papua New Guinea, *Geoscientist* magazine, Geological Society of London 28 (9), p16-19, 2018. [https://www.geolsoc.org.uk/~/~/media/shared/documents/geoscientist/2018/Oct%202018/Geo_OCT2018_WR2.pdf]

McCormick, B.T., 12th Field Workshop of the Commission of the Chemistry of Volcanic Gases, Report for the Deep Carbon Observatory, posted online 21st January 2015 [https://deepcarbon.net/feature/12th-field-workshop-commission-chemistry-volcanic-gases]

(iv) Contributions to Symposia *(*oral)*

B.T. McCormick Kilbride, E.J. Liu, K. Wood, T.C. Wilkes, C.I. Schipper, K. Mulina, T. Richardson, C. Werner, C.S.L. Hayer, A. Aiuppa, M. Bitetto, G. Giudice, T.D. Pering, A.J.S McGonigle, I. Itikarai, First measurements of volcanic gas chemistry at Bagana volcano, Papua New Guinea, COMET Annual Meeting [*virtual*], 2020

B.T. McCormick Kilbride, E.J. Liu, K. Wood, T.C. Wilkes, C.I. Schipper, K. Mulina, T. Richardson, C. Werner, A. McGonigle, T. Pering, A. Aiuppa, M. Bitetto, G. Giudice, I. Itikarai, First measurements of volcanic gas composition at Bagana volcano, Papua New Guinea, EGU General Assembly 2020, EGU2020-10712

B.T. McCormick Kilbride, E.J. Liu, K. Wood, T. Richardson, T.C. Wilkes, C.I. Schipper, K. Mulina, C. Werner, A.J.S. McGonigle, T. Pering, A. Aiuppa, M. Bitetto, G. Giudice, B.S. Ellis, Z. Vukmanovi, G. Nicoli, I. Buisman, G. Wadge, I. Itikarai, M. Edmonds, R.W. Johnson, Volcanic gas chemistry and flux from Bagana: a major "known unknown" deep carbon source?, VMSG 2020, Plymouth.

***McCormick Kilbride, B.T.**, B.S. Ellis, I. Buisman, Z. Vukmanovic, L.C. Salem, M. Edmonds. Geochemistry and petrography of recent lavas from Bagana volcano, Papua New Guinea. VMSG 2019, St Andrews.

***McCormick Kilbride, B.T.,** G. Wadge, K. Mulina, R.W. Johnson and M. Edmonds. Satellite observations of lava and gas fluxes from Bagana volcano. VMSG 2018, Leeds.

McCormick Kilbride, B.T.,** L. Salem, R. D'Aleo, P. Barry, S. Arellano, J. Wallius, B. Galle, K. Mulina, A. Aiuppa, C. Ballentine, T. Fischer and M. Edmonds. Multi-sensor measurements of gas emissions from the volcanoes of Papua New Guinea. Joint Assembly TSG-VMSG-BGA 2017, Liverpool. ***invited

***McCormick Kilbride, B.T.,** L.C. Salem, M. Edmonds, R. D'Aleo, A. Aiuppa, S.R. Arellano, J. Wallius, B. Galle, P.H. Barry, C.J. Ballentine, K. Mulina, M. Sindang, I. Itikarai, G. Wadge, T.M. Lopez, T.P. Fischer. A combined study of gas geochemistry, petrology & lava effusion at Bagana, a unique persistently active lava cone in Papua New Guinea. AGU Fall Meeting 2016, V41C-07.

***McCormick, B.T.,** M. Edmonds, J. Biggs. The critical role of exsolved volatiles on the magnitude of volcano ground deformation, Volcanic and Magmatic Studies Group 2016, Dublin.

McCormick, B.T., M. Edmonds, J.A. Jay, and M. Pritchard (2015), Integrating satellite observations of

volcanic ground deformation and SO2 emissions to understand discrepancies between modelled magma chamber and erupted lava volumes, MeMoVolc 3rd Summer School.

***McCormick, B.T.**, C. Popp, B. Andrews, and E. Cottrell (2015), A new SO2 emissions budget for Anatahan volcano (Mariana Islands) based on ten years of satellite observations, EGU General Assembly, GMPV-6339

C. Popp, **B.T McCormick**, R. Suleiman, K. Chance, B. Andrews, and E. Cottrell (2015), Analysis of volcanic bromine monoxide emissions in the SW Pacific region in 2005 based on satellite observations from OMI, EGU General Assembly, GMPV-9837

McCormick, B.T., E. Cottrell, O.G. Lopez, T.A. Mather, D.M. Pyle and E. Venzke (2013). Towards improved volcanic emissions budgets: opportunities arising from a new global database of volcanic degassing data. AGU Fall Meeting, V13A-2587.

***McCormick, B.T.**, L. Clor, E. Cottrell, T. Fischer, E. Hauri, K. Lehnert, and E. Venzke (2013). A new global database of volcanic gas emissions. IAVCEI Scientific Assembly, 4A2_4H-O12.

***McCormick, B.T.**, J. Yang, M. Edmonds, T.A. Mather, S.A. Carn, S. Hidalgo, B. Langmann, and M. Herzog (2013). An integrated study of SO2 degassing from Tungurahua volcano, Ecuador. EGU General Assembly, EGU2013-13341.

McCormick, B.T., J, Yang, M. Edmonds, T.A. Mather, S.A. Carn, S. Hidalgo, B. Langmann and M. Herzog. (2012). Integrating ground-and satellite-based monitoring of volcanic SO2 degassing. Cities on Volcanoes 7.

McCormick, B.T., J, Yang, M. Edmonds, T.A. Mather, S.A. Carn, S. Hidalgo, B. Langmann and M. Herzog. (2012). Validating OMI measurements of tropospheric SO2. AGU Chapman Conference “Volcanism and the Atmosphere”.

***McCormick, B.T.**, M. Edmonds, T.A. Mather and S. A. Carn. (2011). Arc-scale observations of volcanic SO2: a case study from Papua New Guinea. AGU Fall Meeting, V44C-01.