# ELOISE A. MARAIS

Department of Geography
North West Wing
University College London
London, UK

Tel: +44 2031082481
Email: e.marais@ucl.ac.uk
Profile page: tinyurl.com/5n76wd3v
Lab website: maraisresearchgroup.co.uk

## Major Research Area

I lead a research group that uses complex models (specifically, GEOS-Chem), process-based information from laboratory experiments, and observations from ground-based and space-based sensors to address long-standing uncertainties about the chemical composition of the atmosphere and determine the influence of humans on the environment, air quality, and climate.

## Education

**Ph.D.**, Earth and Planetary Sciences, Harvard University, Cambridge MA 2014
*Research Supervisor:* Professor Daniel J. Jacob
**M.Sc.**, *distinction*, Chemistry, Rhodes University, South Africa 2008
**B.Sc. Hons**, *cum laude*, Chemistry, University of KwaZulu-Natal, South Africa 2004
**B.Sc.**, *summa cum laude*, Chemistry, University of Natal, South Africa 2003

## Professional Experience

**Associate Professor**, University College London, London, UK 2020-*present*
**Associate Professor**, University of Leicester, Leicester, UK 2018-2020
**Research Fellow**, University of Birmingham, Birmingham, UK 2016-2018
**Postdoctoral Research Fellow**, Harvard University, Cambridge MA 2014-2016

## Research Support

**Scholarships, fellowships, and grants awarded to me total more than £2 million.**

**2022** *First long-term MAX-DOAS instrument in London,* UCL Research Capital Equipment Fund, (£48,000), PI
**2021-2024** *Dry deposition processes of volatile organic compounds (VOCDep),* NERC (£160,000), co-I
**2021-2022** *Health impacts and inequities of fossil fuel extraction*, SEI (£36,000), PI
**2020-2022** *Transboundary contributions to $PM_{2.5}$ pollution in Leicester and Leicestershire,* DEFRA (£124,000), PI
**2019-2024** *UpTrop: Fundamental understanding of reactive nitrogen in the upper troposphere*, ERC Starting Grant (£1.3 million), PI
**2019-2020** *Applying Earth observations to reduce uncertainties in emission inventories*, DEFRA (£75,000), co-I
**2019-2020** *Future EO passive optical missions for small satellites*, ESA (£40,000), co-I
**2019-2022** Copernicus Master's Accelerator Programme (£10,000), PI
**2018-2021** *Launching urban air quality and green space monitoring into the 21st century*, NERC-funded EPSRC Researcher In Residence Award (£50,000), PI
**2017-2019** *A systems approach to air pollution in East Africa*, UK Department for International Development (DFID) East Africa Research Fund (£20,000), co-I
**2017-2018** NASA ATom Science Team Member Travel Award (£6,000)
**2016-2018** Birmingham Independent Research Fellowship (£27,000), PI

**2016** *Health effects of current and future fossil fuels*, Wallace Foundation (£8,000), co-I
**2014-2015** *New regional inventory of diffuse and inefficient emissions for Africa,* Schlumberger Faculty for the Future Postdoctoral Grant (£59,000), PI
**2014-2015** Postdoctoral fellowship for research abroad, South African National Research Foundation (NRF) (£29,000)
**2011-2012** Harvard Center for the Environment Graduate Fellowship (£12,000)
**2011-2013** Graduate scholarship for study abroad, South African NRF (£16,000)
**2008-2011** International Fulbright Science and Technology Award (£134,000)
**2004-2007** Numerous BSc Honours and Masters Fellowships, South Africa (£10,000)

## Peer-Reviewed Publications

**Total citations: 3301, h-index: 27 (*Google Scholar*). ORICID: 0000-0001-5477-8051**

Students and postdocs I supervise identified as: ** UG/MSc, * PhD, § Postdoc

**2022**

Kelly, J. M.§, **E. A. Marais**, J. Obszynska, M. Mace, J. White, R. J. Leigh, Diagnosing domestic and transboundary sources of fine particulate matter ($PM_{2.5}$) in UK cities using GEOS-Chem, in review, *City & Environ. Interac*.

Ryan, R. G.§, **E. A. Marais, E. A.**, C. J. Balhatchet**, S. D. Eastham, Impact of rocket launch and space debris air pollutant emissions on stratospheric ozone and global climate, *Earth's Future*, 10, 10, e2021EF002612, doi:10.1029/2021EF002612.

Vohra, K.*, **E. A. Marais**, et al., 180,000 excess deaths in fast-growing tropical cities from 2005 to 2018 linked to rapid rise in anthropogenic air pollution, *Sci. Adv.*, 8, doi:10.1126/sciadv.abm4435.

M. Panagi et al., including G. Lu*, **E. A. Marais**, Daily evolution of VOCs in Beijing: Chemistry, emissions, transport, and policy implications, in review, *ACPD*, doi:10.5194/acp-2022-379.

**Marais, E. A.**, O. Akker**, C. Wiedinmyer, Greenhouse gas and air pollutant emissions from power barges (powerships), *RSC Environ. Sci.: Adv*., 1, 164-169, doi:10.1039/D1VA00049G.

R. Pope, R. Kelly, **E. A. Marais**, et al., Exploiting satellite measurements to reduce uncertainties in UK bottom-up $NO_x$ emission estimates, *Atmos. Chem. Phys.*, 22, 4323–4338, doi:10.5194/acp-22-4323-2022.

A. Mazzeo et al., including **E. A. Marais**, Evaluation of WRF-CHIMERE coupled models for the simulation of $PM_{2.5}$ in large East African urban conurbations, *Atmos. Chem. Phys.*, 22, 10677–10701, doi:10.5194/acp-22-10677-2022.

Langford, B. et al. including **E. A. Marais**, Seasonality of isoprene emissions and oxidation products above the remote Amazon, *Environ. Sci.: Atmos.*, doi:10.1039/D1EA00057H.

**2021**

**Marais, E.A.**, A. Pandey§, et al., UK ammonia emissions estimated with satellite observations and GEOS-Chem, *J. Geophys. Res.*, 126 (18), doi:10.1029/2021JD035237.

**Marais, E. A.**, J. F. Roberts§, R. G. Ryan§, et al., New observations of upper tropospheric $NO_2$ from TROPOMI, *Atmos. Meas. Tech.*, 14, 2389-2408, doi:10.5194/amt-14-2389-2021.

Vohra, K.*, **E. A. Marais**, S. Suckra** et al., Long-term trends in air quality in major cities in the UK and India: A view from space, *Atmos. Chem. Phys.*, 21, 6275–6296, doi:10.5194/acp-21-6275-2021, 2021.

Vohra, K.*, A. Vodonos, J. Schwartz, **E. A. Marais**, et al., Global mortality from outdoor fine particle pollution generated by fossil fuel combustion: Results from GEOS-Chem, *Environ.*

*Res.*, 195, 110754 doi:10.1016/j.envres.2021.110754. ***Extensive media coverage:*** https://www.altmetric.com/details/99822433. Amongst *Environ. Res.*'s most downloaded articles: https://www.journals.elsevier.com/environmental-research/most-downloaded-articles, ***ISI Web of Science Hot and Highly Cited Paper*** (**32 citations**)

Potts, D. A., **E. A. Marais** et al., Diagnosing air quality changes in the UK during the COVID-19 lockdown using TROPOMI and GEOS-Chem, *Environ. Res. Lett.*, 16, 054031, doi:10.1088/1748-9326/abde5d.

Nault, B. et al. including **E. A. Marais**, Models underestimate the increase of acidity with remoteness biasing radiative impact calculations, *Nature Comm Earth & Environ.*, 2, doi:10.1038/s43247-021-00164-0.

**2020**

Bockarie, A.*, **E A. Marais**, A. R. MacKenzie, Air pollution and climate forcing of the charcoal industry in Africa, *Environ. Sci. & Technol.*, 54, 13429–13438, doi:10.1021/acs.est.0c03754.

de Souza, P. et al. including **E. A. Marais**, Combining low-cost, surface-based aerosol monitors with size-resolved satellite data for air quality applications, *Atmos. Meas. Techn.*, 13, 5319–5334, doi:10.5194/amt-13-5319-2020.

McDuffie, E. E. et al., including **E. A. Marais**, A global anthropogenic emission inventory of atmospheric pollutants from sector- and fuel-specific sources (1970-2017): An application of the Community Emissions Data System (CEDS), *Earth Sys. Sci. Data*, 12, 3413-3442, doi:10.5194/essd-12-3413-2020.

Zheng, Y. et al. including **E. A. Marais**, Long-term observational constraints of organic aerosol dependence on inorganic species in the southeast US, *Atmos. Chem. Phys.*, 20, 13091–13107, doi:10.5194/acp-20-13091-2020.

Pai, S. J. et al. including **E. A. Marais**, An evaluation of global organic aerosol schemes using airborne observations, *Atmos. Chem. Phys.*, doi: 10.5194/acp-20-2637-2020.

**2019**

**Marais, E. A.**, R. F. Silvern, A. Vodonos, E. Dupin**, A. S. Bockarie* et al., Air quality and health impact of future fossil fuel use for electricity generation and transport in Africa, *Environ. Sci Technol.*, 53, 13524-13534, doi:10.1021/acs.est.9b04958.

Worden, H. M. et al. including **E. A. Marais**, New constraints on biogenic emissions using satellite-based estimates of carbon monoxide fluxes, *Atmos. Chem. Phys.*, 19, 13569-13579, doi:10.5194/acp-19-13569-2019.

Silvern, R. F. et al. including **E. A. Marais**, Using satellite observations of tropospheric $NO_2$ columns to infer long-term trends in US $NO_x$ emissions: the importance of accounting for the free tropospheric $NO_2$ background, *Atmos. Chem. Phys.*, 19, 8863-8878, doi:10.5194/acp-19-8863-2019.

Jo, D. S. et al. including **E. A. Marais**, A simplified parameterization of isoprene-expoxydiol-derived secondary organic aerosol (IEPOX-SOA) for global chemistry and climate models, *Geosci. Model Dev.*, 12, 2983-3000, doi:10.5194/gmd-12-2983-2019.

Liao, J. et al. including **E. A. Marais**, Towards a satellite-in situ hybrid estimate for organic aerosol abundance, *Atmos. Chem. Phys.*, 19, 2765–2785, doi:10.5194/acp-19-2765-2019.

**2018**

**Marais, E. A.**, D. J. Jacob et al., Nitrogen oxides in the global upper troposphere: interpreting cloud-sliced $NO_2$ observations from the OMI satellite instrument, *Atmos. Chem. Phys.*, 18, 17017-17027, doi:10.5194/acp-18-17017-2018.

Weagle, C. L. et al. including **E. A. Marais**, Chemical sources of fine particulate matter: interpretation of $PM_{2.5}$ chemical composition observed by SPARTAN using a global chemical transport model, *Environ. Sci. Tech.*, 52, 11670-11681, doi:10.1021/acs.est.8b01658.

**2017**

Li, C. *et al.* including **E. A. Marais**, Trends in chemical composition of global and regional population-weighted fine particulate matter over the recent 25 years, *Environ. Sci. Tech.*, 51, 11185−11195, doi:10.1021/acs.est.7b02530.

Lacey, F. G., **E. A. Marais** *et al.*, Improving present day and future estimates of anthropogenic sectoral emissions and the resulting air quality impacts in Africa, *Faraday Discuss.*, 200, 397-412, doi:10.1039/C7FD00011A.

Zhu, L. *et al.* including **E. A. Marais**, Long-term (2005–2014) trends in formaldehyde (HCHO) columns across North America as seen by the OMI satellite instrument: Evidence of changing emissions of volatile organic compounds, *Geophys. Res. Lett.*, 44, 7079–7086, doi:10.1002/2017GL073859.

Cady-Pereira, K. E. *et al.* including **E. A. Marais**, Seasonal and spatial changes in trace gases over megacities from Aura TES observations: two case studies, *Atmos. Chem. Phys.*, 17, 9379-9398, doi:10.5194/acp-17-9379-2017.

Chan Miller, C., D. J. Jacob, **E. A. Marais** *et al.*, Glyoxal yield from isoprene oxidation and relation to formaldehyde: chemical mechanism, constraints from SENEX aircraft observations, and interpretation of OMI satellite data, *Atmos. Chem. Phys.*, 17, 8725–8738, doi:10.5194/acp-17-8725-2017.

Horowitz, H. M. *et al*. including **E. A. Marais**, A new mechanism for atmospheric mercury redox chemistry: implications for the global mercury budget, *Atmos. Chem. Phys.*, 17, 6353-6371, doi:10.5194/acp-17-6353-2017. ***ISI Web of Science Hot Paper and Highly Cited Paper*** (**146 citations**)

**Marais, E. A.**, D. J. Jacob *et al.*, Evidence of 1991-2013 decrease of biogenic secondary organic aerosol in response to $SO_2$ emission controls, *Environ. Res. Lett.*, 12 054018, doi:10.1088/1748-9326/aa69c8.

Silvern, R. F. *et al.* including **E. A. Marais**, Inconsistency of ammonium-sulfate aerosol ratios with thermodynamic models in the eastern US: a possible role of organic aerosol, *Atmos. Chem. Phys.*, 17, 5107-5118, doi:10.5194/acp-17-5107-2017.

**2016**

**Marais, E. A.**, D. J. Jacob *et al.*, Aqueous-phase mechanism for secondary organic aerosol formation from isoprene: application to the Southeast United States and co-benefit of $SO_2$ emission controls, *Atmos. Chem. Phys.*, 16, 1603-1618, doi:10.5194/acp-16-1603-2016. ***ISI Web of Science Highly Cited Paper*** (**153 citations**)

**Marais E. A.**, C. Wiedinmyer, Air Quality Impact of Diffuse and Inefficient Combustion Emissions in Africa (DICE-Africa), *Environ. Sci. Tech.*, 50, 10739-10745, doi:10.1021/acs.est.6b02602.

Travis, K. R. *et al.* including **E. A. Marais**, Why do models overestimate surface ozone in the Southeast United States?, *Atmos. Chem. Phys.*, 16, 13561-13577, doi:10.5194/acp-16-13561-2016. ***ISI Web of Science Hot Paper and Highly Cited Paper*** (**207 citations**)

Fisher, J. A. *et al.* including **E. A. Marais**, Organic nitrate chemistry and its implications for nitrogen budgets in an isoprene- and monoterpene-rich atmosphere: constraints from aircraft (SEAC⁴RS) and ground-based (SOAS) observations in the Southeast US, *Atmos. Chem. Phys.*, 16, 5969-5991, doi:10.5194/acp-16-5969-2016.

Yu, K. *et al.* including **E. A. Marais**, Sensitivity to grid resolution in the ability of a chemical transport model to simulate observed oxidant chemistry under high-isoprene conditions, *Atmos. Chem. Phys.*, 16, 4369-4378, doi:10.5194/acp-16-4369-2016.

B. Franco, **E. A. Marais** *et al.*, Diurnal cycle and multi-decadal trend of formaldehyde in the remote atmosphere near 46°N, *Atmos. Chem. Phys.*, 16, 4171-4189, doi:10.5194/acp-16-4171-2016.

**2015**

Franco, B. *et al*. including **E. A. Marais**, Retrievals of formaldehyde from ground-based FTIR and MAX-DOAS observations at the Jungfraujoch station and comparisons with GEOS-Chem and IMAGES model simulations, *Atmos. Meas. Tech.*, 8, 1733-1756, doi:10.5194/amt-8-1733-2015.

**Marais, E. A.** and K. Chance, A geostationary air quality monitoring platform for Africa, The Clean Air Journal, 25, 40-45, doi:10.17159/2410-972X/2015/v25n1a3.

**2014**

**Marais, E. A.**, D. J. Jacob *et al.*, Anthropogenic emissions in Nigeria and implications for ozone air quality: a view from space, *Atmos. Environ*., 99, 32-40, doi:10.1016/j.atmosenv.2014.09.055.

Zhu, L., *et al.* including **E. A. Marais**, Anthropogenic emissions of highly reactive volatile organic compounds in eastern Texas from oversampling of satellite (OMI) measurements of HCHO columns, *Environ. Res. Lett.*, 9, 114004, doi:10.1088/1748-9326/9/11/114004.

Nowlan, C. R. *et al.* including **E. A. Marais**, Global dry deposition of nitrogen dioxide and sulfur dioxide inferred from space-based measurements, *Global Biogeochem. Cy.*, 28, 1025-1043, doi:10.1002/2014GB004805.

**Marais, E. A.**, D. J. Jacob *et al.*, Improved model of isoprene emissions in Africa using OMI satellite observations of formaldehyde: implications for oxidants and particulate matter, *Atmos. Chem. Phys.*, 14, 7693-7703, doi:10.5194/acp-14-7693-2014.

Wang, Q. *et al.* including **E. A. Marais**, Global budget and radiative forcing of black carbon aerosol: constraints from pole-to-pole (HIPPO) observations across the Pacific, *J. Geophys. Res.*, 119, 195-206, doi:10.1002/2013JD020824. ***ISI Web of Science Highly Cited Paper***. (**131 citations**)

**2013**

Barkley, M. P. *et al.* including **E. A. Marais**, Top-down isoprene emissions over tropical South America inferred from SCIAMACHY and OMI formaldehyde columns, *J. Geophys. Res.*, 118, 6849-6868, doi:10.1002/jgrd.50552.

**2012**

**Marais, E. A.**, D. J. Jacob *et al.*, Isoprene emissions in Africa inferred from OMI observations of formaldehyde columns, *Atmos. Chem. Phys.*, 12, 6219-6235, doi:10.5194/acp-12-6219-2012.

## Invited Presentations

**Archive of presentation slides: http://maraisresearchgroup.co.uk/presentations.html**

**2022**

**UCL Lunch Hour Lecture Series**, UCL, London, UK.
**Global Air Quality Conversation**, Peking University, China.
**Institute of Environmental Sciences webinar**, *virtual*, Institute of Environmental Sciences, London, UK.
**Royal Society of Chemistry Desktop Seminar**, *virtual*, Royal Society, London, UK.

**European Geophysical Union (EGU) Annual General Meeting**, Vienna, Austria**.**
**European Research Council HEAL Workshop,** U. Mannheim, Mannheim, Germany**.**
**European Geophysical Union (EGU) Annual General Meeting**, Vienna, Austria**.**

**2021**

**Investigation of Air Pollution Standing Conference (IAPSC)**, *virtual*, Birmingham, UK.
**Harvard Atmospheric and Environmental Chemistry Seminar**, *virtual*, Cambridge, MA.
**DEFRA EO Centre of Excellence workshop**, *virtual*, London, UK.
**Great Ormond Street Hospital (GOSH) lunchtime seminar**, *virtual*, London, UK.
**Joint EIONET/TFEIP meeting**, *virtual*, Slovakia.
**University of Birmingham Air Pollution and Atmospheric Chemistry seminar series**, *virtual*, Birmingham, UK.
**MIT Program in Atmospheres, Oceans and Climate seminar series**, *virtual*, MIT, Cambridge, MA.
**Town hall meeting on African greenhouse gas emissions and air quality**, *virtual*, Manchester Environmental Research Institute, UK.
**NCAR workshop on Advancing Air Quality and Carbon Science in Africa**, *virtual*, Boulder, CO.
**University of Leeds Institute for Climate & Atmospheric Science**, *virtual*, Leeds, UK.

**2020**

**University of Cambridge Centre for Atmospheric Science,** *virtual*, Cambridge, UK.
**Oxford Air Quality Meeting**, Keble College, Oxford, UK.

**2019**

**Royal Netherlands Meteorological Institute (KNMI),** De Bilt, The Netherlands.
**Connected Places Catapult**, London, UK.
**Webinar on Understanding the Sources of Outdoor Air Pollution in Sub-Saharan Africa**, hosted by the Health Effects Institute (HEI).
**Royal Meteorological Society National Meeting on Air Pollution in Megacities**, University of Leeds, Leeds, UK.

**2018**

**Harvard University**, Environmental Science and Engineering, Cambridge, MA.
**Air Pollution Extremes Workshop**, Columbia University, New York, NY.
**Council for Scientific and Industrial Research (CSIR)**, Pretoria, South Africa.
**University of Cambridge**, Department of Chemistry, Cambridge, UK, 2017.

**2017**

**University of St Andrews**, School of Earth and Environmental Sciences, St Andrews, UK.
**Centre for Ecology & Hydrology**, Edinburgh, UK.
**University of Edinburgh**, School of Geosciences, Edinburgh, UK.

**2016**

**University of Birmingham**, School of Geography, Earth, and Environmental Sciences, Birmingham, UK.
**MIT**, Department of Earth, Atmospheric, and Planetary Sciences, Cambridge, MA.
**Texas A&M**, Atmospheric Sciences, College Station, TX.

**2015**

**Rhodes University**, Department of Chemistry, Grahamstown, South Africa.
**Georgia Institute of Technology**, School of Civil and Environmental Engineering, Atlanta, GA.
**University of East Anglia**, School of Environmental Sciences, East Anglia, UK.

**University of York**, Department of Chemistry and National Centre for Atmospheric Science, York, UK.
**University of Leeds**, School of Chemistry, Leeds, UK.
**University of Manchester**, School of Earth, Atmospheric and Environmental Sciences, Manchester, UK.
**Colorado University**, Cooperative Institute for Research in the Environmental Sciences (CIRES), Boulder, CO.
**National Center for Atmospheric Research**, Atmospheric Chemistry Observations and Modeling, Boulder, CO.

**2014**
**North-West University**, Unit of Environmental Sciences and Management, Potchefstroom, South Africa.
**West Africa Air Quality Workshop**, Abuja, Nigeria.

## Research Supervision

### Professional Development

**2022** *Advancing Principal Investigators*, research team leadership training, UCL, https://www.ucl.ac.uk/human-resources/learning-development/learning-academy/researcher-development/advancing-principal-investigators.

### Current Supervision

**2022-** Eleanor Smith (**PhD**) *Near-term regional climate impact of tropospheric $NO_x$*, funded by the ERC.
**2021-** Karn Vohra (**postdoc**) *Health impacts and inequities of fossil fuel extraction*, funded by the Stockholm Environment Institute (SEI).
**2021-** Rebekah Horner (**PhD**) *Reactive nitrogen in the global upper troposphere*, funded by the ERC.
**2020-** Robert Ryan (**postdoc**) *Fundamental understanding of reactive nitrogen in the upper troposphere*, ERC Research Fellow.
**2019-** Nana Wei (**PhD**) *Improved understanding of reactive nitrogen in the global upper troposphere using NASA aircraft observations and the GEOS-Chem model*, funded by the ERC and University of Leicester studentship.

### Past Supervision

**2018-2022** Gongda Lu (**PhD**) *Interpreting changes in anthropogenic emissions underlying abrupt changes in observed air quality using surface and satellite observations and a chemical transport model*, funded by the Chinese Scholarship Council
**2021-2022** Jamie Kelly (**postdoc**) *Sources of $PM_{2.5}$ pollution in UK cities determined with GEOS-Chem*, Defra Air Quality Grant.
**2021-2022** Kavitha Mottungan (**postdoc**) *Air pollutants and precursors over India: A Satellite and Modeling Perspective*, Royal Society Newton International Fellow.
**2017-2021** Karn Vohra (**PhD**) *A new tool to monitor air pollution in rapidly urbanizing cities*, funded by the University of Birmingham Global Challenges Fund.
**2020** Alok Pandey (**postdoc**) *Satellite-derived emissions of ammonia in the UK*.
**2017-2021** Alfred Bockarie (**PhD**) *Air quality and climate impacts of charcoal production in Africa*, funded by the Islamic Development Bank.

**2020** Chloe Balhatchet (**UG at U. Cambridge**) summer student, *Emission inventory of reactive gases and aerosols from rocket launches and space junk re-entry in 2019*, now a PhD student at University of Cambridge.

**2019** Junju Ng (**MSc at UCL**) external supervisor, *Satellite sensing of $NO_2$ pollution in a large city: a case study using TROPOMI over London*, now Senior Executive at the Singapore National Environment Agency.

**2018** Shannen Suckra (**MSc**) *Trends and variability in $PM_{2.5}$ in Birmingham*, now at the National Environment and Planning Agency in Jamaica.

**2018** Isobel Ward (**MSc**) *The influence of meteorological conditions on ground-level ozone in the UK*, now at AECOM.

**2017** Gongda Lu (**MSc**) *Validation of satellite-derived $PM_{2.5}$ in Chinese megacities*, now a PhD student in my group.

## PhD Examiner

**External**

**2022** C. Mogno, University of Edinburgh, UK.
**2022** I. Riádigos Sánchez, University of Santiago de Compostela, Spain.
**2022** Y. Liu, University of Helsinki, Finland.
**2021** C. K. Segakweng, North-West University, South Africa.
**2020** A. de Lange, University of Pretoria, South Africa.
**2019** L. Gonzalez Alonso, University of Sheffield, UK.

**Internal**

**2021** Damian Oyarzun, Department of Geography, UCL.

## Awards

**2018** ESA Copernicus Masters Competition Finalist, Leicester, UK
**2012** Commendable oral presentation, American Meteorological Society's 1st Conference on Atmospheric Biogeosciences, Boston, MA
**2012** Outstanding student poster award, Atmospheric Sciences Division of the European Geophysical Union, Vienna, Austria
**2005** South African Chemical Society Medal awarded to top BSc Chemistry Honours student, University of KwaZulu-Natal, South Africa
**2004** Merck, SASOL and Perkin-Elmer Medals awarded to top 3rd year Chemistry Undergraduate student, University of KwaZulu-Natal, South Africa
**2002-2004** Dean's commendations for outstanding achievement in Undergraduate and Postgraduate courses, University of Natal/KwaZulu-Natal, South Africa

## Leadership

**International and National Committees**

**2022-2023** UK Air Quality Experts Group (AQEG)
**2021-2022** UK Research and Innovation Future Leader Fellowship Peer Review College
**2020-2023** Health Effects Institute Global Health Oversight Committee
**2017-** International GEOS-Chem Model Steering Committee, Co-Chair of the Emissions and Deposition Working Group
**2020** Co-organizer, 1st GEOS-Chem Europe User's Meeting, *online due to COVID-19*
**2018** HEI Working Group, Contribution of Household Air Pollution to Ambient Air Pollution in Ghana

### Chair of Conferences and Seminar Series

**2022** Session co-chair, Health Effects Institute, Virtual Workshop on Health Applications for Satellite-Derived Air Quality
**2022** Session chair, 10th International GEOS-Chem User's Meeting, Washington University in St Louis, MO.
**2021** Session co-chair, Health Effects Institute Annual Conference, *online due to COVID-19*
**2020** Session co-chair, American Geophysical Union (AGU) Annual General Meeting, *online due to COVID-19*
**2019** Session chair, 9th International GEOS-Chem User's Meeting, Harvard, Cambridge, MA
**2018** Session co-chair, UK National Centre for Earth Observations Conference, Birmingham, UK
**2018** Session co-chair, AGU Annual General Meeting, Washington, DC
**2017** Chair, Air Pollution and Atmospheric Chemistry seminar series, University of Birmingham, Birmingham, UK
**2017** Session co-chair, AGU Annual General Meeting, New Orleans, LA
**2015** Chair, Atmospheric Chemistry seminar series, Harvard, Cambridge, MA

### Author: International Reports

**2021** Chapter Author, Chapter 2 in *Sustainable Development, Air Pollution and Climate Change in Africa: An Integrated Assessment*
**2019** Household Air Pollution Working Group, *Contribution of Household Air Pollution to Ambient Air Pollution in Ghana: Using Available Evidence to Prioritize Future Action*, HEI, Communication 19, https://www.healtheffects.org/system/files/Comm19-HAP-Ghana.pdf.
**2016** Contributing Author, *Air Quality in Tropical and Subtropical Megacities*, Submitted to 2017-2027 USA National Research Council Decadal Survey for Earth Observations from Space Request for Information (RFI-2)

## Peer Review

### Grant Agencies

**2022** Belgian Science Policy Office (**BELSPO**) BRAIN-be 2.0 Research Programme review panel
**2022** UK **Engineering** and Physical Sciences Research Council (**EPSRC**) review panel
**2020** Canada Foundation for Innovation's (**CFI**) Innovation Fund review panel
**2020** UK National Environmental Research Council (**NERC**) review panel
**2020** **BELSPO** BRAIN-be 2.0 Research Programme review panel
**2019** **US EPA** STAR Grant reviewer and review panel
**2019** Irish Research Council Government of Ireland Postdoctoral Fellowship Scheme reviewer
**2017** UK **NERC** reviewer
**2017** National Oceanic and Atmospheric Association (**NOAA**) Atmospheric Chemistry, Carbon Cycle and Climate (AC4) Program reviewer
**2016** European Research Council (**ERC**) Advanced Grant reviewer
**2015** **NOAA** AC4 Program reviewer
**2015** **BELSPO** STEREO Research Programme reviewer
**2013** **NASA** Research Opportunities in Earth and Space Science (ROSES) Carbon Cycle Science reviewer

### Journals

Frequent reviewer for numerous prestigious scientific journals:

*Proceedings of the National Academy of Sciences, Nature Communications, Scientific Reports, Environmental Science & Technology, Atmospheric Environment, Atmospheric Chemistry and Physics, Atmospheric Measurement Techniques, Journal of Air & Waste Management, Environmental Science & Technology Letters, Geoscientific Model Development, Journal of Geophysical Research, Aerosol & Air Quality Research, Environment International, Science of the Total Environment.*

**International Assessment Reports**

**2022** European Organisation for the Exploitation of Meteorological Satellites (**EUMETSAT**) Atmospheric Composition Monitoring Satellite Application Facilities (AC SAF) IASI instrument data products

**2018** International Global Atmospheric Chemistry (**IGAC**) project Tropospheric Ozone Assessment Report

## Teaching

**Training and Accreditation**

**2020** Fellow of the Higher Education Academy (FHEA)

**2010** *Harvard Bok Center Teacher Training,* Harvard University, Cambridge, MA

**2009** *Scientists Teaching Science,* graduate course on effective science teaching, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA

**Experience**

**2022** Convener, **GEOG0170**: *Environmental Consequences of Human Activity*, Physical Geography 3rd Year Module, UCL, London, UK

**2022** Lecturer, **GEOG0151**: *Thinking Geographically I*, Physical Geography 1st Year Module, UCL, London, UK

**2021-2022** Lecturer, **GEOG0012**: *Thinking Geographically II*, Physical Geography 1st Year Modules, UCL, London, UK

**2021-2022** Supervisor, **GEOG0105:** *Master's Research Project and Dissertation*, Geography Master's Module, UCL, London, UK

**2020-2022** Lecturer, **GEOG0005:** *Understanding Our Planet*, Physical Geography 1st Year Module, UCL, London, UK

**2020-2021** Supervisor, **GEOG0042:** *Independent Study*, Geography 3rd Year Module, UCL, London, UK

**2019-2020** Lecturer, *Waves and Quanta*, Physics 1st Year Module, University of Leicester, Leicester, UK

**2019** Course Developer, *Masters in Satellite Data Science*, University of Leicester, Leicester, UK

**2018-2019** Supervisor, Physics 3rd and 4th Year project students, University of Leicester, Leicester, UK

**2017** Lecturer, *Environmental Protection*, Environmental Science 3rd Year Module, University of Birmingham, Birmingham, UK

**2013** Teaching Assistant, *Energy Technology*, Harvard University, Cambridge, MA

**2010** Teaching Assistant, *Introduction to Environmental Science*, Harvard University, Cambridge, MA

**2009** Teaching Assistant, *Environmental Science and Technology*, Harvard University, Cambridge, MA

**2009** Teaching Assistant, *Atmospheric Chemistry*, Harvard, Cambridge, MA

**2006** Tutor and Laboratory Demonstrator, *Introductory Chemistry*, Rhodes University, South Africa

**2005** Tutor, *Introduction to Chemistry*, University of KwaZulu-Natal, South Africa

## Media Engagement

Expertise sought on air pollution and public health:

New Scientist, https://institutions.newscientist.com/article/2320777-pollution-killed-9-million-people-worldwide-in-2019-alone/

Media coverage of Vohra et al. (2022), doi:10.1126/sciadv.abm4435 on premature deaths from rapid rise in air pollution for fast-growing cities in the tropics:

New York Times, https://www.nytimes.com/2022/04/08/climate/air-pollution-cities-tropics.html

World Economic Forum, https://www.weforum.org/agenda/2022/04/air-pollution-cars-remote-sensing-air-quality-improvement/

The Guardian, https://www.theguardian.com/environment/2022/jun/03/satellite-imagery-air-pollution-rise-tropical-megacities

Popular Science, https://www.popsci.com/environment/tropic-megacities-air-pollution/

New Scientist, https://institutions.newscientist.com/article/2315496-tropical-city-air-pollution-led-to-470000-premature-deaths-in-2018/

Air Quality News, https://airqualitynews.com/2022/04/12/air-pollution-responsible-for-180000-excess-deaths-in-tropical-cities/

South Africa Today, https://southafricatoday.net/environment/air-pollution-is-fast-getting-worse-in-tropical-cities/

Media coverage of the environmental impact of space tourism and space debris:

BBC, https://www.bbc.com/future/article/20220713-how-to-make-rocket-launches-less-polluting?

Time Magazine, https://time.com/6191846/billionaire-space-race-climate/

Forbes, https://www.forbes.com/sites/davidrvetter/2022/07/05/bezos-vs-musk-which-billionaires-rockets-are-worse-for-the-climate/?sh=7fe5425b150c

Sky News, https://news.sky.com/story/space-tourism-from-companies-like-spacex-virgin-atlantic-and-blue-origin-could-undo-work-to-repair-ozone-layer-study-finds-12640296

Scientific American, https://www.scientificamerican.com/article/don-rsquo-t-fear-china-rsquo-s-falling-rocket-mdash-fear-the-future-it-foretells/

Evening Standard, https://www.standard.co.uk/news/uk/space-tourism-ucl-massachusetts-institute-of-technology-university-of-cambridge-spacex-b1008378.html

Yale Climate Connections, https://yaleclimateconnections.org/2022/09/the-climate-cost-of-space-tourism/

Space.com, https://www.space.com/space-junk-threat-research-reduce-impact

International Business Times, https://www.ibtimes.com/space-debris-polluting-our-atmosphere-researchers-look-ways-reduce-impact-3610800

abc News, https://abcnews.go.com/Technology/experts-climate-impacts-question-mark-space-tourism-takes/story?id=81609878

Sky News, https://www.youtube.com/watch?v=At7D7_LhsyA
Die Zeit, The Dirty War to Mars *[German]*
Channel 4 News, https://www.channel4.com/news/spacex-launch-makes-history-as-four-amateur-astronauts-orbit-earth
CNBC, https://www.cnbc.com/2021/08/27/how-blue-origin-spacex-virgin-galactic-space-race-could-impact-the-atmosphere.html
Smart Prosperity Podcast, https://institute.smartprosperity.ca/podcast21 *[interview at 10 min 09 sec]*
The Guardian, https://www.theguardian.com/business/2021/jul/25/billionaire-space-cowboys-could-become-heroes-by-focusing-on-the-climate-crisis
The Guardian, https://www.theguardian.com/science/2021/jul/19/billionaires-space-tourism-environment-emissions
CTV News, https://www.ctvnews.ca/climate-and-environment/space-travel-is-open-for-business-but-what-about-the-environmental-impact-1.5506132
BBC World Service, https://www.bbc.com/afrique/monde-59556066 *[French]*, https://www.bbc.com/zhongwen/trad/world-59551259 *[Chinese]*
ABC's The Signal Podcast, https://www.abc.net.au/radio/programs/the-signal/billionaires-space-race/13597636 *[interview at 18 min 22 sec]*
NPR's 1A Podcast, https://the1a.org/segments/bezos-branson-space-billionaires/ *[interview at 36 min 40 sec]*
Aerospace America, https://aerospaceamerica.aiaa.org/features/space-transportations-pollution-conundrum/
Mashable, https://mashable.com/article/space-tourism-environmental-costs

Media coverage of Vohra et al. (2021), doi:10.5194/acp-21-6275-2021 on air pollution trends in cities in the UK and India:
https://phys.org/news/2021-04-hidden-air-pollutants-cities-india.html
https://econews.com.au/66423/hidden-air-pollutants-on-the-rise-in-cities-in-india-and-the-uk-study/
https://www.cnbctv18.com/india/levels-of-air-pollutants-on-rise-in-indian-cities-study-9104501.htm
https://economictimes.indiatimes.com/news/india/levels-of-air-pollutants-on-rise-in-indian-cities-study/articleshow/82304287.cms
https://scienmag.com/hidden-air-pollutants-on-the-rise-in-cities-in-india-and-the-uk-study/
https://www.eurasiareview.com/29042021-hidden-air-pollutants-on-rise-in-cities-in-india-and-uk/

Extensive media coverage of Vohra et al. (2021), doi:10.1016/j.envres.2021.110754 on global early deaths due to air pollution from fossil fuel combustion. Select coverage:
Tweet by environmental activist Greta Thunberg: tinyurl.com/7liwievc
Tweet by historian Naomi Oreskes:
https://twitter.com/NaomiOreskes/status/1359244585852092419
https://www.theguardian.com/environment/2021/feb/09/fossil-fuels-pollution-deaths-research
https://www.independent.co.uk/news/uk/home-news/air-pollution-fossil-fuels-deaths-b1799380.html
https://www.reuters.com/article/us-health-pollution-fossil/fossil-fuel-pollution-causes-one-in-five-premature-deaths-globally-study-idUSKBN2A90UB
https://www.thetimes.co.uk/article/pollution-from-fossil-fuels-twice-as-deadly-as-thought-scientists-warn-lxbgtp6pc/
https://www.bloomberg.com/news/articles/2021-02-09/fossil-fuel-pollution-kills-millions-more-than-scientists-knew

https://www.newscientist.com/article/2267035-deaths-from-fossil-fuel-air-pollution-are-double-what-we-thought/
https://www.bostonglobe.com/2021/02/09/metro/burning-fossil-fuels-kills-an-estimated-350000-people-year-study-finds/
https://news.harvard.edu/gazette/story/2021/02/deaths-from-fossil-fuel-emissions-higher-than-thought/
https://www.forbes.com/sites/carlieporterfield/2021/02/09/fossil-fuel-pollution-caused-nearly-1-in-5-global-deaths-in-2018-groundbreaking-study-suggests/
https://www.huffpost.com/entry/fossil-fuel-air-pollution_n_6022a51dc5b6c56a89a49185
https://www.cbsnews.com/news/fossil-fuel-air-pollution-emissions-1-in-5-deaths-worldwide-each-year/

Expertise sought on the climate impact of aircraft emissions:

BBC, https://www.bbc.co.uk/news/science-environment-49349566.

## Public Engagement

**2022** The Conversation, Air pollution in fast-growing African cities presents a risk of premature death, https://theconversation.com/air-pollution-in-fast-growing-african-cities-presents-a-risk-of-premature-death-183944, ***3,312 reads, 23 Tweets, 24 Facebook shares***

**2022** The Conversation, Axiom launch: why commercial space travel could be another giant leap for air pollution, https://theconversation.com/axiom-launch-why-commercial-space-travel-could-be-another-giant-leap-for-air-pollution-180990, ***38,518 reads, 15 Tweets, 21 Facebook shares, 20 comments***

**2021** The Conversation, Ditching fossil fuels will have immediate health benefits for millions – world leaders must seize the chance, https://theconversation.com/ditching-fossil-fuels-has-immediate-health-benefits-for-millions-world-leaders-must-seize-the-chance-171015, ***8,045 reads, 11 Tweets, 249 Facebook shares, 2 comments***

**2021** The Conversation, Space tourism: rockets emit 100 times more $CO_2$ per passenger than flights – imagine a whole industry, https://theconversation.com/space-tourism-rockets-emit-100-times-more-co-per-passenger-than-flights-imagine-a-whole-industry-164601, ***108,358 reads, 682 Tweets, 4292 Facebook shares, 51 comments***

**2019** Co-ordinator, First Leicester chapter of the *International Pint of Science Festival*, Leicester, UK.

**2019** Presenter, *International Pint of Science Festival*, Leicester, UK.

**2019** Lecturer, *British Council Air Quality Capacity Building Workshop*, University of Nairobi, Nairobi, Kenya.

**2018** Presenter, *International Pint of Science Festival*, Birmingham, UK.

**2017** Lecturer, *NASA/COSPAR Capacity Building Workshop*, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

## Professional Membership

NASA ATom Science Team and Airborne Program
European Geophysical Union
American Geophysical Union
Royal Society of Chemistry
Earth Science Women's Network
Fulbright Alumni Association
Harvard Alumni Association