

## ELOISE A. MARAIS

Geography, Earth & Environmental Sciences  
University of Birmingham  
Edgbaston, UK

Tel (mobile): +44(0) 7902 100140  
Email: marais.eloise@gmail.com  
Website: maraisresearchgroup.co.uk

### EDUCATION

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

### PROFESSIONAL EXPERIENCE

<b>Research Fellow</b> , University of Birmingham, Edgbaston, UK	2016-present
<b>Postdoctoral Research Fellow</b> , Harvard University, Cambridge MA	2014-2016

### RESEARCH INTERESTS

My group uses complex models, process-based information from chamber studies, and observations from ground-based and space-based sensors to enhance understanding of the influence of humans on atmospheric chemistry and in so doing provide the knowledge required to develop prescient environmental policy.

#### **Current research projects include:**

- Anthropogenic controls on biogenic organic aerosol.
- Air quality, climate and ecosystem impacts of charcoal production, use, and transport in Africa.
- Health effects of fossil fuel use in Africa now and in the future.
- Using Google Location History to track personal exposure to air pollution.
- End user urban air quality monitoring tools from space-based observations.
- New remote sensing products for improved constraints on ozone formation.

### RESEARCH SUPPORT

#### **Scholarships, fellowships, and grants awarded total £370,000 (\$495,000).**

<b>2018-2021</b>	<i>Launching urban air quality and green space monitoring into the 21st century</i> , UK Engineering and Physical Sciences Research Council (EPSRC) Researcher In Residence Award (£50,000)
<b>2017-2019</b>	<i>A Systems Approach to Air Pollution in East Africa</i> , UK Department for International Development (DFID) East Africa Research Fund (£20,000)
<b>2017-2018</b>	NASA ATom Science Team Member Travel Award (£5,000)
<b>2016-2018</b>	Birmingham Independent Research Fellowship (£27,000)
<b>2016</b>	<i>Health effects of fossil and traditional fuels</i> , Wallace Foundation (£8,000)
<b>2014-2015</b>	<i>Air quality in Africa</i> , Schlumberger Faculty for the Future Postdoctoral Grant (£59,000)
<b>2014-2015</b>	South African National Research Foundation (NRF) Postdoctoral Fellowship for research abroad (£29,000)
<b>2011-2012</b>	Harvard Center for the Environment Fellowship (£12,000)
<b>2011-2013</b>	South African NRF Graduate Scholarship for study abroad (£16,000)
<b>2008-2011</b>	International Fulbright Science and Technology Award (£134,000)
<b>2004-2007</b>	Multiple BSc Honours and Masters Fellowships (£10,000)

## AWARDS

- 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 3<sup>rd</sup> 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

## PEER-REVIEWED PUBLICATIONS

**Total citations is 618, h-index is 14 (Google Scholar). ORCID: 0000-0001-5477-8051**

**2018**

**Marais, E. A.,** C. Wiedinmyer, Using Google Location History to track personal exposure to air pollution, submitted to *Environ. Sci. Tech. Lett.*

**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.

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.

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.

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.

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.

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.

**Marais, E. A.,** D. J. Jacob *et al.*: Evidence of 1991-2013 decrease of biogenic secondary organic aerosol in response to SO<sub>2</sub> emission controls, *Environ. Res. Lett.*, 12 054018.

Silvern, J. A. *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.

**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<sub>2</sub> emission controls, *Atmos. Chem. Phys.*, 16, 1603-1618.

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

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.

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 (SEAC<sup>4</sup>RS) and ground-based (SOAS) observations in the Southeast US, *Atmos. Chem. Phys.*, 16, 5969-5991.

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.

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.

### **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.

### **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.

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.

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.

**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.

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.

### **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.

### **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.

## **INVITED PRESENTATIONS**

**University of Cambridge**, Department of Chemistry, Cambridge, UK, 2017.

**University of St Andrews**, School of Earth and Environmental Sciences, University of St Andrews, UK, 2017.

**Centre for Ecology & Hydrology**, Edinburgh, UK, 2017.

**University of Edinburgh**, School of Geosciences, Edinburgh, UK, 2017.

**University of Birmingham**, School of Geography, Earth, and Environmental Sciences, Birmingham, UK, 2016.

**MIT**, Department of Earth, Atmospheric, and Planetary Sciences, Cambridge, MA, 2016.

**Texas A&M**, Atmospheric Sciences, College Station, TX, 2016.

**Rhodes University**, Department of Chemistry, Grahamstown, South Africa, 2015.

**Georgia Institute of Technology**, School of Civil and Environmental Engineering, Atlanta, GA, 2015.

**University of East Anglia**, School of Environmental Sciences, East Anglia, UK, 2015.

**University of York**, Department of Chemistry and National Centre for Atmospheric Science, York, UK, 2015.

**University of Leeds**, School of Chemistry, Leeds, UK, 2015.

**University of Manchester**, School of Earth, Atmospheric and Environmental Sciences, Manchester, UK, 2015.

**Colorado University**, Cooperative Institute for Research in the Environmental Sciences (CIRES), Boulder, CO, 2015.

**National Center for Atmospheric Research**, Atmospheric Chemistry Observations and Modeling, Boulder, CO, 2015.

**North-West University**, Unit of Environmental Sciences and Management, Potchefstroom, South Africa, 2014.

**West Africa Air Quality Workshop**, Abuja, Nigeria, 2014.

## **MEDIA COVERAGE**

Dec 2017, COSPAR's Information Bulletin, *COSPAR Capacity Building Workshop on Interdisciplinary Remote Sensing, Modeling, and Validation of Environmental Processes, Kumasi, Ghana, 12-23 June 2017*, 200, p. 50-54.

May 19, 2016, Inter Press Service News: *Many Cities Don't Know How Dangerous Their Air Pollution Is*, L. Rowlands: [www.ipsnews.net/2016/05/many-cities-dont-know-how-dangerous-their-air-pollution-is/](http://www.ipsnews.net/2016/05/many-cities-dont-know-how-dangerous-their-air-pollution-is/)

## **RESEARCH SUPERVISION**

**2017-** Alfred Bockarie (PhD) *Air quality, climate and ecosystem impacts of charcoal production in Africa*, co-supervisor with A. R. MacKenzie

**2017-** Karn Vohra (PhD) *A new tool to monitor air pollution in rapidly urbanizing cities*, co-supervisor with W. J. Bloss

**2017-** Jeremy Lu (PhD) *Developing the capacity to forecast surface ozone concentrations in China*, co-supervisor with Z. Shi.

## **TEACHING**

### **Training**

**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**

**2017** Lecturer, *Environmental Protection*, University of Birmingham, UK

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

**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 University, Cambridge, MA

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

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

## **PROFESSIONAL SERVICES**

### **International Leadership**

**2017** International GEOS-Chem Model Steering Committee, Co-Chair of the Emissions and Deposition Working Group

**2013** Head of the International Fulbright Science & Technology Alumni Election Committee

### **Seminar Series Organizer**

- 2017 University of Birmingham Air Pollution & Atmospheric Chemistry (APAC) seminar series, Birmingham, UK  
2015 Harvard University Atmospheric Chemistry seminar series, Cambridge, MA

### **Mentor**

- 2017 Mentor for the AGU Undergraduate Mentoring Program, New Orleans, LA  
2017 Judge, Outstanding Student Paper Award (OSPA), AGU, New Orleans, LA  
2013 Professional Development Mentor, Fulbright Science & Technology Capstone Conference, Washington, DC

### **Author: Scoping Reports**

- 2015 E. A. Marais and K. Chance, A geostationary air quality monitoring platform for Africa, *The Clean Air Journal*, 25, 40-45, <http://bit.ly/2CSFp8D>.  
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: Journals**

Frequent reviewer for numerous prestigious scientific journals:

*Proceedings of the National Academy of Sciences, Atmospheric Environment, Atmospheric Chemistry and Physics, Journal of Air and Waste Management, Environmental Science & Technology, Environmental Science & Technology Letters, Journal of Geophysical Research, Geoscientific Model Development.*

### **Peer Review: Grant Agencies**

- 2017 UK National Environmental Research Council (NERC)  
2017 National Oceanic and Atmospheric Association (NOAA) Atmospheric Chemistry, Carbon Cycle and Climate (AC4) Program  
2016 European Research Council (ERC) Advanced Grant  
2015 NOAA AC4 Program  
2015 Belgian Science Policy Office (BELSPO) STEREO Program  
2013 NASA Research Opportunities in Earth and Space Science (ROSES) Carbon Cycle Science

### **Peer Review: International Assessment Reports**

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

### **Professional Memberships**

NASA ATom Science Team Member  
European Geophysical Union (EGU)  
Royal Society of Chemistry (RSC)  
Earth Science Women's Network (ESWN)  
South African Association of Women Graduates  
Fulbright Alumni Association.