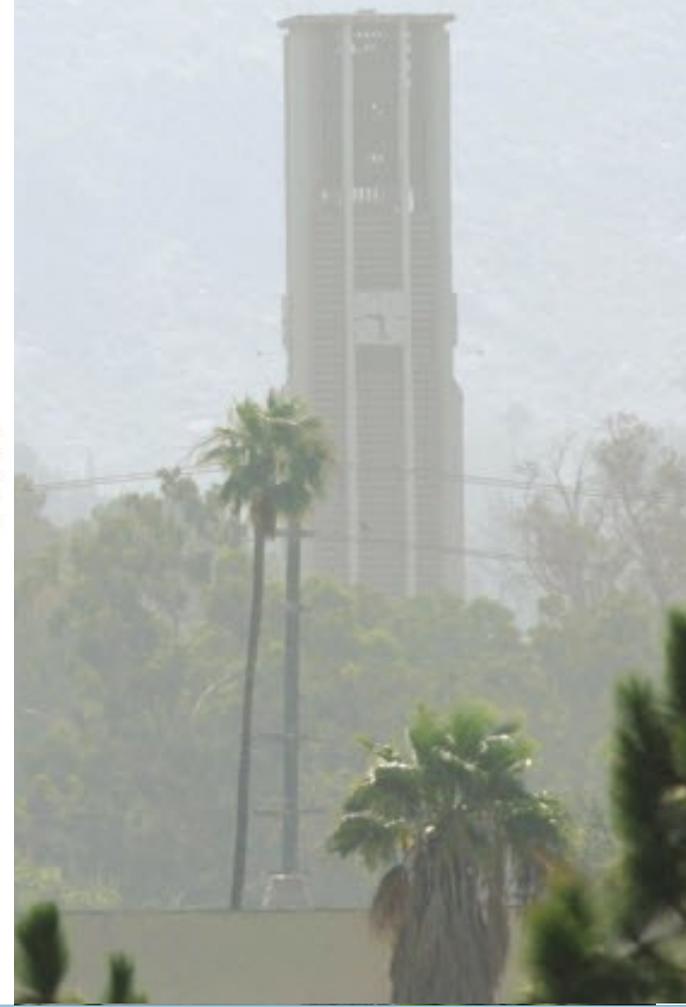


# WORKSHOP April 12, 2018



## BREATHE Center Workshop

Thursday, April 12, 2018

12:00 PM - 4:00 PM

SOM Education Building, 1670

- 12:00 PM Lunch and Welcome
- 12:35 PM Introduction
- 12:45 PM **Phillip Lehmann, PhD**  
"Healthy Air - Healthy Society: Climate Change and Climate Engineering in North Africa, 1870-1930."
- 1:15 PM **William Porter, PhD**  
"Regional chemical transport modeling opportunities and applications".
- 1:45 PM **David Cocker, PhD**  
"Engineering the Air We Breathe."
- 2:15 PM **Tara Nordgren, PhD**  
"Dust and diet: Environmental factors impacting inflammation and lung health"
- 2:45 PM **Mia Maltz, PhD**  
"From the soil to the air: Dust associated microbes and the lung microbiome."
- 3:00 PM **Dr. David Lo, MD, PhD**  
Planning Discussion

### BREATHE: Bridging Regional Ecology, Aerosolized Toxins, & Health Effects

The BREATHE Center at the University of California, Riverside School of Medicine is a multidisciplinary collaborative for studies Bridging Regional Ecology, Aerosolized Toxins, and Health Effects. Research efforts among our collaborative include regional climate modeling, culture and policy studies on air quality and health, environmental justice and health disparities, and the health impacts of aerosolized particles including dusts, soil microbes, allergenic pollens from invasive species, and pollutants.

Our main partners in this work include faculty in the Center for Conservation Biology (CCB), the College of Engineering Center for Environmental Research and Technology (CE-CERT), and Biomedical Sciences in the School of Medicine.

Affiliated faculty include researchers in the Bourns College of Engineering (BCOE), the College of Natural and Agricultural Sciences (CNAS), the College of Humanities, Arts, and Social Sciences (CHASS), the School of Public Policy (SPP), and the School of Medicine (SOM). We also have affiliations with the Science and Technology Studies group in the UCR Center for Ideas and Society, and Health Assessment and Research for Communities (HARC), and we will be joining the larger group efforts of the developing Institute for Air Quality and Climate Change.

### Our Current Projects

A sampling of ongoing BREATHE-associated research projects:

Small environmental chamber: The lab of Professor of Biomedical Sciences David Lo and CE-CERT built a small environmental chamber to do long term exposure studies in models of inflammation. Initial studies in collaboration with Assistant Professor Meera Nair's and Professor Monica Carson's labs have been on the effects of chronic exposure to allergens.

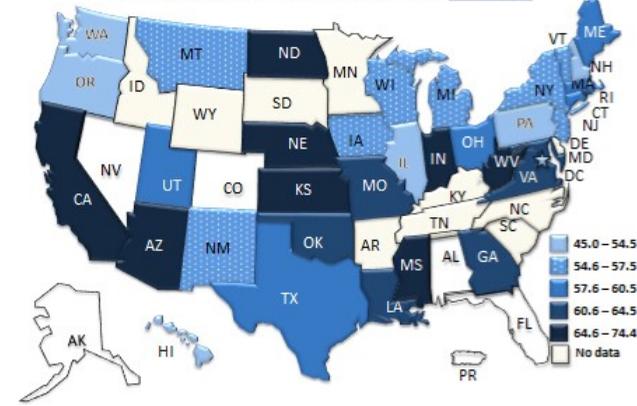
The lab of Assistant Professor of Plant Pathology and Microbiology Emma L. Aronson is looking at material from particle collectors in the Coachella Valley to identify microbes and other material in aerosol particulates. The lab has also submitted proposals to study the effects of inhaled particulates on the lung microbial ecology.

### Recruiting for BREATHE

Recruitment for BREATHE is continuing to expand our work in several interdisciplinary areas that address critical issues in air quality and health.

### Asthma Severity Among CHILDREN with Current Asthma

Nearly 60% of children with current asthma \* have persistent asthma; 40% have intermittent asthma. [Read more...](#)



### Asthma Severity Among ADULTS with Current Asthma

Nearly 65% of adults with current asthma \* have persistent asthma; 35% have intermittent asthma; [Read More...](#)



### Asthma Deaths

Age-Adjusted Asthma Mortality Rate by Race, NVSS, 2007



Asthma was the underlying cause of death for 402 adults and 17 children in California<sup>2</sup>. The age-adjusted asthma mortality rate in California was 11.8/million and the U.S. rate was 11.0/million<sup>3</sup>.

## BREATHE Center Affiliates



### Michael F. Allen, PhD

Professor, Plant Pathology & Biology & Microbiology & Ecologist Director, Center for Conservation Biology Chair, Department of Biology

**Main Research Interest:** Soil Fungi, Ecosystem Processes

**Main Research Methods:** Microscopy of soil fungal organisms and sensor detections of ecosystem processes

**Interests Relating to BREATHE:** Desert Ecology, and fungi, including allergens



### Emma L. Aronson, PhD

Assistant Professor, Plant Pathology & Microbiology

**Main Research Interest:**

**Main Research Methods:**

**Interests Relating to BREATHE:**



### Roya Bahreini, PhD

Associate Professor, Atmospheric Science

**Main Research Interest:** Aerosol source identification, chemical characterization, and atmospheric transformation; aerosol direct and indirect impacts on climate

**Main Research Methods:** Laboratory and ambient measurements of aerosol chemical and physical properties

**Interests Relating to BREATHE:** Chemical characterization of aerosols in Coachella/Imperial Valley; assessing health impacts of trace metals vs. organic vs. inorganic components of aerosols



### Kelley C. Barsanti, PhD

Assistant Professor, Chemical & Environmental Engineering

**Main Research Interest:** Characterizing emissions of organic compounds, building mechanistic models of particulate matter formation.

**Main Research Methods:** Characterization of gas- and particle-phase organics using two-dimensional gas chromatography/mass spectrometry. Single particle to 0-D box models of particle growth and conversion of gas-phase emissions to particulate matter.

**Interests Relating to BREATHE:** We do a lot of work on biomass burning emissions, and have previously done work on plant emissions. We are also interested in the use of low-cost sensors, including their development and communication of results/risk. We use our mechanistic box models to develop parameterizations for air quality models that link emissions to concentration distributions and (arguably indirectly) to health outcomes.



### Monica J. Carson, PhD

Professor and Chair of Biomedical Sciences

**Main Research Interest:** Microglia and CNS Immunity: roles in brain health, neurodevelopmental & neurodegenerative disorders.

**Main Research Methods:** Cellular and Molecular assays of immune cell function. Assays of CNS histopathology. Neuronal and glial cell cultures. IPCS- derived human cell cultures.

**Interests Relating to BREATHE:** How does exposure to inhaled toxicants (man-made and natural) Alter susceptibility and progression of neurodevelopmental and neurodegenerative disorders.



### David Cocker, PhD

Professor of Chemical and Environmental Engineering

**Main Research Interest:** Secondary organic aerosol formation, emission characterization and air quality systems.

**Main Research Methods:**



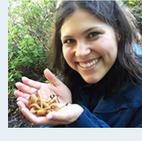
### Marilyn Fogel, PhD

Wilbur W. Mayhew Endowed Professor of Geoecology Director, EDGE Institute

**Main Research Interest:** Biogeochemistry; Stable isotope ecology; Salton Sea; paleoecology and climatology.

**Main Research Methods:** Stable isotope laboratory at natural abundance levels

**Interests Relating to BREATHE:** Salton Sea and other California regions where gases or atmospheric pollutants could be traced using stable isotopes.



### Sydney I. Glassman, PhD

Assistant Professor, Department of Plant Pathology and Microbiology

**Main Research Interest:** Soil microbial ecology, fungal ecology, fungal dispersal, fungal-bacterial interactions, ectomycorrhizal fungal symbiosis, microbial response to disturbances such as wildfires and climate change, leaf litter decomposition.

**Main Research Methods:** Field work, greenhouse work, culturing work (fungi and bacteria), molecular work: DNA extractions, high throughput sequencing of 16S and ITS amplicons, sequencing genomes, bioinformatics and analysis: bioinformatics for amplicon based metagenomics and genomics, statistical analysis in R

**Interests Relating to BREATHE:** What factors affect dispersal of fungi and bacteria from soil into human habitats, how do microbes respond after disturbances (could be human related – disease, asthma, CF), how are lung microbiomes affected by and linked to soil microbial ecology and what are the functional responses for human health? What traits make up good microbial dispersers and/or dormancy, how do microbes come out of dormancy?



### Ivey Cesunica, PhD

Assistant Professor of Chemical and Environmental Engineering

**Main Research Interest:** Air pollution source identification; air pollution from agricultural activities and wildfires; air quality and respiratory health; regional and global modeling feedbacks; climate resiliency; environmental justice; air quality and renewable energy nexus

**Main Research Methods:** Chemical transport modeling; global atmospheric modeling; statistical data assimilation; GIS analysis; remote sensing

**Interests Relating to BREATHE:** To understand population exposure to aerosolized toxins. I am specifically interested in the aerosolized organic pesticide exposure of communities downwind of agricultural activities, which requires laboratory, field, and modeling experiments.



### Georgios Karavalakis, PhD

Associate Researcher, Associate Adjunct Professor of Center for Environmental Research & Technology and Department of Chemical & Environmental Engineering

**Main Research Interest:** Air quality impacts from alternative fuels and their interaction with emerging engine technologies. Emphasis on toxic pollutants, combustion nanoparticles and their formation mechanisms, and secondary organic aerosol from different combustion systems.

**Main Research Methods:** Laboratory testing with engines/vehicles and detailed characterization of the physical and chemical properties of particles, as well as the employment of an environmental chamber and/or oxidation flow reactor for the evaluation of secondary aerosol formation from mobile sources.

**Interests Relating to BREATHE:** Biological properties and health implications of combustion nanoparticles and PM from combustion sources, as well as the toxicity of secondary aerosols from mobile sources.



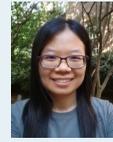
### Philipp Lehmann, PhD

Assistant Professor of History

**Main Research Interest:** History of climatology/climate science/global circulation. History of macro-engineering in desert environments.

**Main Research Methods:** Qualitative historical analysis

**Interests Relating to BREATHE:** Historical dimension of large engineering projects in desert environments and their social/ecological/health effects.



### Ying-Hsuan Lin, PhD

Assistant Professor of Environmental Toxicology

**Main Research Interest:** Understanding the health effects of particulate matter in a changing climate

**Main Research Methods:** Comprehensive characterization of organic aerosol constituents and gas-phase intermediates in laboratory and field studies using advanced analytical techniques to link sources, atmospheric transformations and molecular composition/functional group information to human health effects. Assessing the environmental exposure-induced genetic, epigenetic and metabolic changes within in vitro biological systems to gain mechanistic insights into health effects of air pollution

**Interests Relating to BREATHE:** The research in Lin Lab aims to provide mechanistic insights into the sources, atmospheric transformations, chemical composition, and health effects of particulate matter (PM) air pollution to ultimately mitigate its impact on air quality, human health and the climate system



### David D. Lo, MD, PhD

Distinguished Professor of Biomedical Sciences Senior Associate Dean, Research

**Main Research Interest:** Mucosal immunology and vaccine development, host-pathogen interactions, environmental exposures and pulmonary health.

**Main Research Methods:** Environmental chamber exposure model, animal models of inflammatory disease, microscopy.

**Interests Relating to BREATHE:** Environmental aerosol particulate exposure, air quality and health effects



### Keith Miyake, PhD

Assistant Professor of Ethnic Studies

**Main Research Interest:** Environmental justice, racial capitalism, political economy, urban planning, environmental governance, environmental law and public policy, the prison industrial complex

**Main Research Methods:** Historical materialism, archival methods, geographical information sciences (GISc)

**Interests Relating to BREATHE:** Studying the relationships between environmental policy and environmental justice communities in terms of political power, health outcomes, and social movement building. Thinking about incarcerated populations as immobilized and dehumanized environmental justice communities, particularly with respect to things like healthcare, exposure to toxics, valley fever, etc.



### Meera G. Nair, PhD

Assistant Professor of Biomedical Sciences

**Main Research Interest:** Immune mechanisms underlying inflammation in the lung in infection and allergic inflammation. Specifically, she investigates macrophages, a critical innate cell-type that plays a role in immunity to pathogens. Dependent on the activation stimuli, macrophages can either be beneficial by clearing debris, dead cells and restoring immune homeostasis, or pathologic, by exacerbating inflammation. Dr. Nair is interested in delineating

the protective versus pathogenic activation pathways and macrophage-secreted molecules that can be targeted to treat lung inflammation. In particular, she has developed macrophage reporter mice, and genetically deficient mice for the macrophage-derived molecule RELM $\alpha$  to track macrophages and understand RELM $\alpha$  function.

**Main Research Methods:** Immunological methods in the Nair lab include in vivo lung infection models, immune cell profiling by flow cytometry, cytokine quantification by bead array and T cell and macrophage culture, lung histology and immunofluorescent staining, bronchioalveolar lavage.

**Interests Relating to BREATHE:** Understanding how environmental pollutants, allergens or toxins affect the lung inflammatory response and macrophage function. Given that macrophages are the main phagocytes of the body involved in clearing debris, what role (beneficial or pathologic) do they play in the lung following exposure to particulate matter, debris or toxins? Additionally, what is the effect of allergen or toxin exposure on subsequent immunity to infection in the lungs?



### Tara M. Nordgren, PhD

Assistant Professor of Biomedical Sciences

**Main Research Interest:** Investigating the role of omega-3 fatty acid-derived lipid mediators in resolving lung inflammation caused by environmental exposures. My long-term research goals include identifying the mechanisms underlying these bioactive lipids and harnessing their pro-resolution properties to prevent inflammatory diseases.

**Main Research Methods:** I employ a variety of research methods, including in vivo modeling of lung inflammation, in vitro cell culture studies, ex vivo studies using human lung tissue, and population-based approaches.

**Interests Relating to BREATHE:** I am interested in how numerous environmental factors impact human health and disease, including specific interests in how environmental aerosolized particles impact lung health, and how diet impacts an individual's inflammatory response to these exposures.



### William Porter, PhD

Assistant Professor of Atmospheric Dynamics and Modeling

**Main Research Interest:** Regional and global air quality model application and development, human health impacts of air pollution, land/atmosphere interactions, chemistry/climate feedbacks, environmental justice issues

**Main Research Methods:** CESM (global earth systems model), GEOS-Chem (regional/global chemical transport model), WRF/Chem (regional chemical transport model)

**Interests Relating to BREATHE:** Analysis of pollutant exposure differences within Riverside County, particularly with respect to groups of varying socioeconomic status and healthcare access. Exploration of particle/chemical species that are currently poorly represented (or not included at all) in traditional chemical transport models, including bioaerosol and transported bacteria. Improved representation of current and projected air quality and associated human health impacts within southern California through improved emissions, chemistry, and particle formation mechanisms.



### Dana Simmons, PhD

Assistant Professor of History

**Main Research Interest:** History of science; hunger, famine, food insecurity; STS (Science, Technology and Society).

**Main Research Methods:** Archival research (state and laboratory archives,) analysis of historical scientific publications, engagement with STS theory.

**Interests Relating to BREATHE:** Fostering dialogue and collaboration between the sciences and the humanities; the Salton Sea, the history of fertilizer and agricultural runoff.