



This photo shows aerosols being generated using the MAGIC apparatus as part of the research performed in the Nizkorodov laboratory.



## Educational Opportunities

AirUCI provides outstanding opportunities for undergraduates, postdoctoral researchers, and UCI faculty to contribute to our research projects... and they do!

This is particularly beneficial for students who wish to further their studies in the areas of smart energy, health, and a sustainable environment. Our researchers employ innovative laboratory techniques using the latest equipment — as well as the occasional “classic” apparatus — to achieve the best and most reliable results.

Our computer modeling facility is second to none and allows us to accurately model our theoretical and lab results. All laboratory members of the AirUCI team have access to these tools in performing research tasks. In addition to the vital lab work they perform, our team members from undergrads on up regularly give presentations at scientific meetings held by such notable groups as the American Chemical Society, American Geophysical Union, American Association for Aerosol Research Specialty Health Conference, and many others.

All members of our AirUCI team contribute to the published papers we submit to peer-reviewed journals, including widely-read interdisciplinary publications like *Science* and *Nature*. AirUCI offers exceptional educational opportunities for students at every level — including summer community college and high school internships — and we boast a long history of offering presentations for local schools and the lay public. We take pride in knowing that our institute promotes higher-level science education across a broad spectrum, from grade school to high school and beyond, inspiring the next generation of scientists and citizens.



## ATMOSPHERIC INTEGRATED RESEARCH

AT THE  
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# AirUCI Institute

*...smart energy, sustainable environment*



The AirUCI Institute is an Organized Research Unit (ORU) located at the University of California, Irvine. We're a multidisciplinary research group dedicated to understanding and solving the crucial concerns relating to air pollution, climate change, agriculture, adaptation, sustainability, and green technology — from local to global scales.

Our integrated group of world-renowned health scientists, researchers, and engineers endeavor to elucidate the essential science and impacts of these threats and their effects on human health, global societies, and the ecological state of our planet.

Our award-winning team conducts collaborative, fundamental research utilizing advanced modeling, cutting-edge technology, field studies, and state-of-the-art laboratory and engineering techniques, uncovering new approaches to solving these vital issues and creating innovative solutions to minimize their effects on people and our planet.

## Who We Are

The AirUCI team has a long, established history of effective scientific collaboration. Professors from five UCI schools comprise our institute, and each has his or her own research group as well as being part of AirUCI, including postdoctoral scholars, graduate and undergrad students, and staff researchers.

### School of Physical Sciences

Jane M. Baldwin	Donald R. Blake
Anmarie G. Carlton	Claudia Czimczik
Steven J. Davis	Michael B. Dennin
Barbara Finlayson-Pitts	Filipp U. Furche
R. Benny Gerber	Alex B. Guenther
John C. Hemminger	Saewung Kim
Craig Murray	Sergey Nizkorodov
Michael J. Prather	Eric S. Saltzman
James Randerson	Manabu Shiraiwa
James N. Smith	Douglas C. Tobias

### School of Medicine

Rufus Edwards	Michael T. Kleinman
Ulrike Luderer	Andrea De Vizcaya-Ruiz
Jun Wu	

### Henry Samueli School of Engineering

Jacob Brouwer	G. Scott Samuelsen
Vojislav Stamenkovic	

### School of Social Sciences

Kim Fortun	Michael Fortun
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### School of Biological Sciences

Celia Faiola



## What We Do

We are dedicated to furthering understanding of and discovering solutions for the critical environmental issues we face. We collaborate with leading scientists and research institutions around the world in pursuit of this goal.

- Measurement of trace gases involved in air pollution and climate change at the level of *parts-per-trillion*
- Cross-cutting experiments and modeling that provide molecular-level insight into atmospheric processes such as the formation and fates of particles in indoor as well as outdoor air
- Translation and application of laboratory studies of the impacts of air pollutants, including wildfires, to human health and epidemiology
- Development of new technologies and resource strategies to minimize emissions of agricultural chemicals, CO<sub>2</sub>, exhaust, building materials, etc. into the atmosphere
- Field studies and measurements in regions as diverse as the polar caps, third world countries, the Amazon, the oceans, and the stratosphere
- Combining theory, experiments, and computer modeling in new ways to provide cutting-edge, transformative insights into previously unrecognized causes of pollution and environmental degradation
- State-of-the-art models from local to global scales that provide an integrated view and facilitate development of cost-effective and health-protective energy strategies

We make our findings available to lawmakers and agencies such as the South Coast Air Quality Management District, the California Air Resources Board, and the California State Environmental Protection Agency. This cooperation helps ensure that policy-makers can base decisions about health and environmental issues on the latest findings in the fields of air quality and its effects on human health, atmospheric chemistry, alternative energy development, agricultural production, societal adaptation to climate change, land management implications, and other vital policy areas.



***AirUCI researchers are among the world's experts in a wide range of health and ecological fields.***

**Air quality and pollution:** Over a dozen AirUCI researchers study the composition of the atmosphere, including gases, particles, water droplets, as well as the effects of sunlight, temperature, and the oceans on atmospheric changes.

**Climate change:** increases in CO<sub>2</sub> and other gas emissions cause changes to the earth's climate. We study the sources, develop alternative energy options, and form strategies for human adaptation to changing conditions.

**Health effects of pollution:** Indoor and outdoor air pollution is long associated with ailments such as asthma, high blood pressure, various types of cancer, low birth weight babies, and significantly shortened life spans. We study pesticides, cooking methods, building materials, and more to uncover additional health factors.

**COVID-19:** Several AirUCI researchers initiated—and continue—projects as the COVID-19 virus arose in early 2020. We test for optimal mask fabrics, develop apps to track its spread, and research its chemical and biological composition.

**Agriculture:** We study the effects of pesticide usage, climate shifts, ozone levels, plant selection, and more to measure crop productivity and identify more sustainable options for food production in various regions.

**Deforestation and fires:** Field studies from the Arctic to the Amazon track increases in wildfires and deforestation of Earth's jungles and woodlands which are vital to a healthy atmosphere and to moderate weather patterns across the globe.

**Ice core sampling and analysis:** Ice core samples record changes in climate and reveal the content of ancient atmospheres, helping researchers understand the implications of current shifts in planetary temperatures and weather events.