

PARTICULARS

The E-Newsletter of the American Association for Aerosol Research

WINTER 2020

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As always, we'd love any feedback or suggestions you may have for **Particulars**

Simply email info@aaar.org with the subject line '**Particulars**'

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President's Message

Dear AAAR Members,

It is with gratitude and enthusiasm that I begin my term as president of AAAR. I am thankful for the dedicated members who have served before me to make our association a well-functioning, welcoming and collaborative environment for the advancement of aerosol science. On a personal level, I am grateful for the many thoughtful interactions I have had over the past 20 years with AAAR members who have helped shape my research program and career. I am also excited about the future of our association and the opportunities that lay ahead. In particular, I would like to make progress in two areas this year: first, to assure that we can support our underrepresented minority members now and in the future; and, second, to continue to provide administrative and financial stability to support the primary mission of the organization.

We have an opportunity to provide a model for how an organization can nurture an inclusive, equitable environment for scientific exchange. In October, the AAAR Board of Directors passed a motion to establish an ad hoc **Committee for Representation and Equity Affairs**. The committee will assess the needs of the AAAR community and propose a path forward using evidence-based sources to support their recommendations. For example, the committee will evaluate ways to improve accessibility and inclusiveness at AAAR events, achieve true representation of minorities in leadership roles, and support and mentor early career URM members as they negotiate their careers in aerosol science and technology. Look for updates in 2020 issues of **Particulars** as well as new programming associated with the 38th Annual AAAR Conference in Raleigh, North Carolina next October.

If you are interested in serving on this ad hoc committee, or if you have ideas that you would like to share with the committee, please let us know by contacting the Board of Directors liaison to the committee, Arantza Aranguran (arantza@aerosol.us), or me (aferro@clarkson.edu).

We are working hard to improve the administrative and financial support systems of the society. The Board of Directors recently overhauled the *AAAR Policies & Procedures (P&P)* document to provide guidance and improve leadership transitions. The P&P is intended as a "living document which will continuously evolve as our organization matures and grows and as fresh ideas emerge with new leadership." You can find the P&P in the MEMBERS ONLY area of the AAAR website aaar.org/myaaar/.

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AAAR is also in excellent financial health, able to meet our expenses and financial goals as well as support our awards. While most of our endowment funds have reached the level that they are true endowments, we are still actively growing our two newest funds: The Presidents Fund and the AS&T Outstanding Publication Award Fund. If you would like to donate to these or any of our other funds, please visit our new donations page: <https://www.aaar.org/donations/>.

Before signing off, I would like to extend a **big thank you to the 2019 Annual Conference Chair Sally Ng**, all our sponsors and exhibitors, the Conference and Program Committees, **Donald Dabdub** and his team for abstract management, the AAAR business office, symposia organizers, presenters, poster judges, and all who helped to make the 2019 conference in Portland a huge success. As you can see from Sally Ng's report in this issue of *Particulars*, we had record-breaking participation in the conference and also piloted new special events in the program. If you were unable to attend the annual conference in Portland, OR this past October, **you may renew your AAAR membership online at aaar.org/myaaar/**. Membership includes online access to the journal *Aerosol Science and Technology* and one free abstract submission code for the 2020 conference.

This coming year, **Matti Maricq**, the 2020 Annual Conference Chair, the Conference and Program Committees, and many others will be busy putting together our next conference. I hope to see you at our **AAAR 38th Annual Conference, October 5-9, 2020** at the Raleigh Convention Center in North Carolina. ●

Andrea R. Ferro

AAAR President



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37th Annual Meeting Reflections

The 37th AAAR Annual Conference took place in Portland, OR, October 14 to October 18, 2019. The conference welcomed 939 attendees who gave 372 platform and 458 poster presentations, and 32 exhibitors housed in 36 booths. All of these numbers are records for a domestic meeting for AAAR, showing that aerosol science has been and continues to be an exciting and growing research field.

The conference hosted three excellent special symposia:

- 1. From Aerosol Dosimetry and Toxicology to Health**
Organized by: **Otmar Schmid**, **Arthur Chan**, and **Flemming Cassee**
- 2. Biomass Combustion: Emissions, Chemistry, Air Quality, Climate, and Human Health**
Organized by: **Amy Sullivan**, **Andy May**, **Amara Holder**, and **Shelly Miller**
- 3. The Air We Breathe: Indoor Aerosol Sources and Chemistry**
Organized by: **Rachel O'Brien** and **Marina Vance**
- 4. Air Quality Sensors: Low-Cost ≠ Low Complexity**
Organized by: **Eben Cross**, **Pratim Biswas**, and **John Volckens**

The week began with 16 tutorials on Monday. An exciting array of plenary talks, special symposia, poster sessions, platform presentations, and special events took place from Tuesday morning through Friday noon. Each day of the technical session opened with a plenary lecture. **Flemming Cassee** from the Dutch National Institute for Public Health and the Environment gave the Friedlander Lecture on Tuesday entitled "Airborne Ultrafine Particles and Nanomaterials: Adverse Effects on the Respiratory System and Beyond". We were delighted that members of the Friedlander family were able to attend this lecture. **Shelly Miller** from University of Colorado Boulder gave a plenary lecture on Wednesday on "What to do about the Toll Biomass Burning is taking on our Health, Indoor Environments, and Climate". On Thursday, **Hope Michelsen** from University of Colorado Boulder presented a plenary lecture on "Soot Formation and Chemical Evolution during Combustion". Finally, **Neil Donahue** from Carnegie Mellon University presented the AEESP Lecture on Friday entitled "This is Getting Dynamic: How the Volatility Basis Set Informs Particle Formation and Growth".

In addition to a wonderful technical program, we also had many exciting special events at the conference. New to this year's meeting are Meet the Job Seekers poster session, Meet the Program Managers, and Aerosol Video Competition. The Meet the Job Seekers event took place on Tuesday evening where ~60 outstanding job candidates presented a poster on their background and expertise to potential employers across academia, government, and industry. For the Meet the Program Managers event, we welcomed 7 program managers from multiple agencies (**Karl Rockne**, **Sylvia Edgerton**, and **Anne Johansen** from NSF; **Serena Chung** from EPA; **Stephanie Shaw** from EPRI; **Barry Lefer** from NASA; and **Donald Crounce** from DHS and DTRA) for engaging in 15-meetings

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with conference attendees throughout the week. The video competition provided a great opportunity to create videos that promote aerosol science to a wider audience. Following last year's success, we also continued the "Meet the Aerosol Pioneers" series this year. Our featured pioneers were **Lara Gundel** (Lawrence Berkeley Laboratory), **Spyros Pandis** (University of Patras and Carnegie Mellon University), and **Roger McClellan** (Independent advisor on inhalation toxicology and risk analysis).

AAAR Gratefully Acknowledges the Generous Support of this Year's Conference Sponsors

Platinum Sponsor:

- › National Aeronautics & Space Administration (NASA)

Bronze Sponsors include:

- › Center for Aerosol Science and Engineering (CASE) at Washington University in St Louis
- › TSI
- › US Environmental Protection Agency (EPA)

Supporting Sponsors include:

- › Anthropocene Institute
- › Cambustion
- › Cooper Environmental
- › Sunset Laboratory

Contributing Sponsors include:

- › Association of Environmental Engineering & Science Professors (AEESP)
- › Aerodyne Research
- › Aethlabs
- › National Oceanic and Atmospheric Administration (NOAA).

I would like to acknowledge many people for their hard work in making this conference a success. I want to thank **Bill Carney**, **Jackie Wu**, and **Homaira Sheikh** from Association Headquarters for organizing and coordinating many activities that are central to the conference. I am deeply grateful to **Donald Dabdub** and **Jeff Lindley** for handling the large volume of abstract submissions and online program and keeping track of everything. I also want to thank **Rawad Saleh** and **Kirsten Koehler** (Tutorials), **Scott Epstein** (Early Career), **Andrea Ferro** (Development), **Pat Keady** and **Julie Stone** (Exhibits), **Shunsuke Nakao** (Student Poster Competition), the working group chairs and co-chairs, special symposia organizers (technical program), the session chairs and co-chairs, student assistants, and all organizers and coordinators of the special events. It has been an honor to have the opportunity to work with such a wonderful team. Without their effort, time, and dedication, we would not have an outstanding conference!

The 38th AAAR Conference will be held in Raleigh, NC from October 5 to October 9, 2020. We look forward to seeing you there! •

Nga Lee (Sally) Ng
2019 Conference Chair



OCTOBER 5–9, 2020

Raleigh Convention Center | Raleigh, NC

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37th Annual Meeting Awards & Honors

CONFERENCE AWARDS:

New AAAR Fellows

Sheryl Ehrman
San Jose State University

Neil Donahue
Carnegie Mellon University

C. Y. Wu
University of Florida

Sheldon K. Friedlander Award

Jing Li
Peking University

Kenneth T. Whitby Award

Rajan Chakrabarty
Washington University
in St. Louis

Thomas T. Mercer Award

Jack R. Harkema
Michigan State University

David Sinclair Award

Tiina Reponen
University of Cincinnati

Benjamin Y. H. Liu Award

Jasper Kirkby
CERN

AS&T Outstanding Publication Award

Chris Sorensen
Kansas State University



2019 Student Poster Competition Winners

STUDENT POSTER COMPETITION:

Austin Andrews	University of Minnesota
Henry Colby	Drexel University
Madeline Cooke	University of Michigan
Blaine Fry	Kansas State University
Shahzad Gani	University of Texas at Austin
Nethmi Kasthuriarachchi	National University of Singapore
Kaitlyn Koehler	Clarkson University
Theresa Kucinski	The Pennsylvania State University
Dana McGuffin	Carnegie Mellon University
Abu-Sayeed-Md Shawon	Michigan Technological University
Natalie Smith	University of California, Irvine
Matthew Stewart	Harvard University
Manpreet Takhar	University of Toronto
Marc Webb	University of North Carolina at Chapel Hill
Haoran Yu	University of Illinois Urbana-Champaign

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PARTICLE ART AWARDS:

Submicrometer Static Art

1st Place Clayton Kacica and Girish Sharma

2nd Place Namsoon Eom

3rd Place Timothy Sipkens

Larger than Submicrometer Static Art

1st Place Michael Valerino and Lucas Rocha-Melogno

2nd Place Nathan Reed, Girish Sharma, and Pratim Biswas

3rd Place Natalie Smith, Jesse Crescenzo, Yuanzhou Huang,
Allan Bertram, and Sergey Nizkorodov

Particle Competition Videos

1st Place Julia Bakker-Arkema and Marina Vance

https://www.youtube.com/watch?v=_sMuXtjZndY

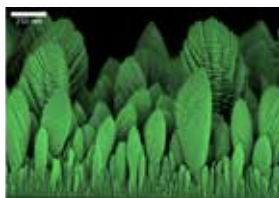
2nd Place Kayane Dingilian, Tong Sun, Yang Han, Xuepeng
(Andrew) Deng, Archit Datar, and Elizabeth Jergens

<https://www.youtube.com/watch?v=L74ZWbschxo>

3rd Place Mara Otero-Fernandez and Allen Haddrell;

https://www.youtube.com/watch?v=Z7P_-s3Loq8&feature=youtu.be

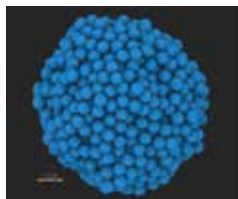
Submicrometer Static Art Winners



1st Place: Titanium Dioxide Trees

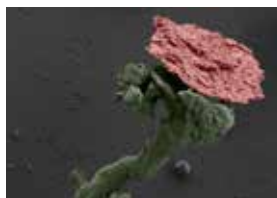


2nd Place: A Cherry Blossom of Gold

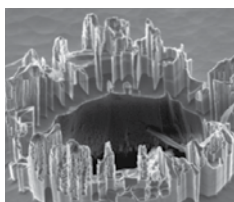


*3rd Place: Rendering of an Iron Nanoparticle
Consisting of 1241 Atoms Simulated Using
Molecular Dynamics*

Larger than Submicrometer Static Art Winners



1st Place: Bloom of Dust



*2nd Place: Castle of Satan
around the Abyss of Demons*



*3rd Place: Stressed Particle
at the Breaking Point*

Video Competition Winners



1st Place



2nd Place



3rd Place

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AS&T Article Highlight

By Kerry E. Kelly

“Long-term sensor measurements of lung deposited surface area of particulate matter emitted from local vehicular and residential wood combustion sources”

Joel Kuula, Heino Kuuluvainen, Jarkko V. Niemi, Erkka Saukko, Harri Portin, Anu Kousa, Minna Aurela, Topi Rönkkö, and Hilikka Timonen (2019), *Aerosol Science and Technology*

<https://doi.org/10.1080/02786826.2019.1668909>

Most studies that seek to understand the health effects of particulate matter (PM) focus on PM mass concentration or size-fractionated PM concentration. A number of studies support the value of additional measurements, such as particle composition, particle number, and surface area, to assist with understanding how particle properties affect human health. However, these measurements tend to be expensive, particularly for ultrafine particles that make small contributions to particle mass concentration but are large contributors to particle number and surface area. Ultrafine particles, such as those from combustion sources, are generally too small to be effectively detected by optical methods, common in low-cost particulate matter sensors. The expense of measuring particle size and surface area limits the amount of data that can be collected. Kuula and co-authors evaluated a mid-priced diffusion charger to estimate lung-deposited surface area (LDSA) in four different regions of an urban area (Helsinki, Finland) that are affected by vehicle emissions and residential wood combustion. This appears to be the first long-term deployment of diffusion chargers in a sensor network.

They compared the LDSA estimated from a diffusion charger over a 12-month period with that estimated from a differential mobility particle size (DMPS). As illustrated in *Figure 2* of the article, the LDSA from the diffusion charger correlated well with the DMPS, and the slope of the linear relationship varied slightly by season from 1.10 (March) to 0.86 (October), which was likely associated with seasonal differences in the particle size distribution. The LDSA measurements were also highly correlated with black carbon measurements, which highlights the usefulness of diffusion chargers for measuring combustion-generated particles. Over the course of the study, the diffusion charger measurements did not exhibit significant drift, and the LDSAs in the four different locations exhibited differences. For example, the LDSAs in an urban street canyon were more than double that of the urban background site. In addition, residential wood combustion caused LDSA peaks in the evening.

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This study highlights the potential utility of a sensor network that includes diffusion chargers to estimate LDSA. This type of information could prove valuable for understanding the links between particle properties and health effects and future policies related to PM standards and emission controls. ●

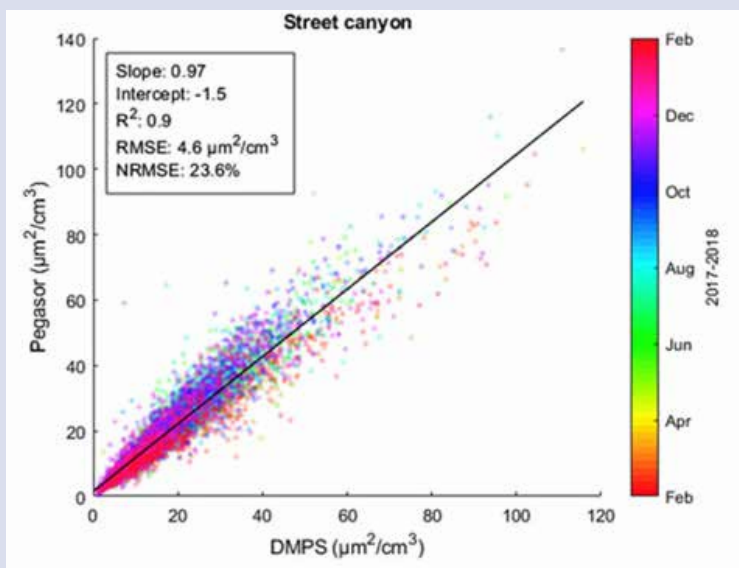
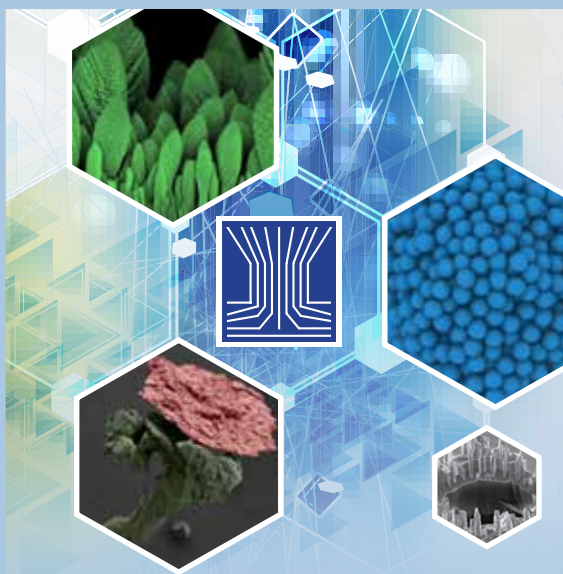


Figure 2 (from paper).

Scatterplot of lung-deposited surface area measured with the diffusion charger and DMPS. The color of the data points indicates the time of the measurement.



AAAR 38TH Annual Conference



OCTOBER 5–9, 2020

Raleigh Convention Center | Raleigh, NC

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Aerosol Scientist in the Spotlight

By Gabriel Isaacman-Van Wertz



Dr. Melissa Galloway

Assistant Professor of Chemistry at Lafayette College

Research Website: <https://sites.lafayette.edu/gallowam/>

Faculty Website: <https://chemistry.lafayette.edu/people/melissa-m-galloway/>

1. How did you get involved in the aerosol science community, or how did you first become interested in aerosol science?

I started graduate school knowing I wanted to focus on an environmental issue, but my first foray into aerosol research occurred when I joined **Frank Keutsch**'s lab at the University of Wisconsin-Madison. His work primarily focused on gas-phase measurements, but my work dealt with the aqueous chemistry of glyoxal. It wasn't until we started a collaboration with John Seinfeld's group to use their atmospheric chambers that I really started to think about the aerosol itself and how the uptake of VOCs can significantly influence the chemistry occurring within the particle, which has been my focus ever since.

2. Which people or programs in our field have been the most influential to you and your path, or who have most influenced your ideas about aerosol research?

I have worked tangentially with many people in our field, but the most influential people have been my advisors. Frank Keutsch handed me a list of projects that related to aerosol chemistry and let me create a research project that I was most interested in. His enthusiasm for everything we worked on led me to a variety of research topics and allowed me to explore both gas- and aerosol-phase chemistry. The way I performed research took an abrupt turn when I joined **David De Haan**'s research lab at the University of San Diego as a postdoc. David taught me so much about performing high quality research at a primarily undergraduate institution and how to think about research through a narrower lens than I had previously used. I use many of the lessons I learned during my postdoc in my research lab today.

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3. What are, in your opinion, the most interesting or important research contributions you've made so far? What is it about your research questions that have grabbed your attention?

I have always found myself drawn to the questions surrounding the chemistry occurring within aerosol particles, but I think my recent work will become my most important so far. We have gone back to fundamental organic chemistry to understand the behavior of both the products and reactants found within aerosol. As a field, we have identified several compounds that may be important brown carbon contributors, but we have not had the time to study each of them in detail. My research involves taking a bottom up approach for determining the reaction mechanisms for small carbonyl-ammonium systems and studying the properties of the resultant products. We have been able to identify reaction mechanisms for formation of brown carbon species such as imidazoles and pyrazines in carbonyl—ammonium reaction mixtures, and have found that some small hydroxycarbonyls react in ways that we previously considered improbable. This approach to determining particle chemistry can be useful as we apply similar chemical mechanisms to larger systems.

4. What do you see as the major opportunities and challenges of conducting research at a primarily undergraduate institution?

One of the major challenges of conducting research at a primarily undergraduate institution is that research is not my primary focus or that of my students. I need to be able to come up with experiments that can be done in a 2-4 hour blocks of time, sometimes by students who have never taken organic or analytical chemistry. This means my research program moves much more slowly than some of my colleagues at bigger schools, but allows us to take our time and really dig into some of the fundamental chemical mechanisms that are occurring in order to help inform conclusions drawn by other research groups. These projects are perfect for undergraduates to work on as they're learning the organic chemistry mechanisms that we are so interested in. One of the major advantages of a primarily undergraduate institution is the students I work with. Some of my best students are those who plan to go on to graduate school in engineering or work at a pharmaceutical company and who bring a completely different viewpoint to their work. Several times, this has encouraged me to think about a different way to explain a phenomenon I thought I understood, and so in breaking concepts down to very basic ideas for the students, I find a better way to approach my research. ●

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Student Chapter Highlights

Carnegie Mellon University – Pittsburgh, Pennsylvania

President: Bailey Bowers



Carnegie Mellon University members help plant over 600 trees along the Three Rivers Heritage Trail.

On November 9, members of the chapter volunteered at a tree-planting event organized by Western Pennsylvania Conservancy. Together with many other volunteers from the greater Pittsburgh area, they helped to plant over 600 native-species trees along the Three Rivers Heritage Trail!

Charles University – Prague, Czech Republic

President: Jan Bendl



Student chapter advisor Jan Hovorka explains the temperature inversion phenomenon and the chamber setup to the public guests at "Scientist's Night" in October.

Students at Charles University established a visualization of a temperature inversion in a chamber display for "Scientist's Night", an event open to families, young students and children. Attendees of this October event got to witness and discuss the important impacts of this phenomenon on air quality.

Additionally, AAAR members partic-

ipated in laboratory testing of the particle collection efficiency of different air purifiers and measured sources and hot-spots of air pollution in Prague with instruments in backpacks. Finally, they are continuing with their bee-keeping activities on Charles University Campus, and have repaired hives in preparation for next year's honey production.



UC Riverside members at Keys View in Joshua Tree National Park. There they hosted a short discussion about their research and how their work will improve air quality in the future.

University of California, Riverside – Riverside, California

President: Ayla Moretti

In June 2019, the UC-Riverside (UCR) AAAR student chapter hosted an overnight camping trip to Joshua Tree National Park. Twelve students in the UCR AAAR student chapter attended for one day and eight students camped at Cottonwood campground. While at Joshua Tree, they saw many of the must-see spots such as: Skull Rock, Barker Dam, Cap Rock, and Keys View. They chose Joshua Tree for their summer event due to the sweeping view of the area from Keys View. They were able to look out over Coachella Valley and see the Salton Sea, San Andreas Fault, as well as the poor air quality over the area. ●

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In Case You Missed It

By Gabriel Isaacman-Van Wertz

Independent Particulate Matter Review Panel Convenes to Review PM Standards

In 2018, the U.S. Environmental Protection Agency disbanded its Particulate Matter Advisory Panel of independent scientists, which has historically convened every five years to assess the national ambient air quality standards for particulate matter. This panel advised the EPA's Clean Air Science Advisory Committee, the makeup of which was also changed to include fewer scientists. The former members of this panel nevertheless convened in October of this year as an Independent Particulate Matter Review Panel to conduct the same review the EPA has declined to support in order to ensure independent scientific review of our national air quality standards.

Read more:

<https://www.ucsusa.org/meeting-independent-particulate-matter-review-panel>

<https://www.reuters.com/article/us-usa-epa-scientists/members-of-disbanded-epa-air-quality-panel-form-independent-group-idUSKBN1WB2W4>

New Delhi Declares Air Quality Public Health Emergency

In New Delhi this month, schools closed and flights were canceled due to particulate matter concentrations in the hundreds of micrograms per cubic meter. Every winter, air quality degrades in this city of 20 million as farmers burn their fields to clear them, colder temperatures bring inversions, and fireworks are set off for the five-day festival of Diwali. Air quality events have consequently become an annual issue that the city is trying to combat by limiting cars in the city, halting construction, and banning open burning, but the public health emergency is likely to persist.

Read more:

<https://www.cnn.com/2019/11/04/india/delhi-india-smog-pollution-intl-hnk/index.html>

<https://www.nytimes.com/2019/11/01/world/asia/delhi-pollution-health-emergency.html>

<https://www.wsj.com/articles/hazardous-smog-in-new-delhi-forces-government-to-take-emergency-steps-11572879014>

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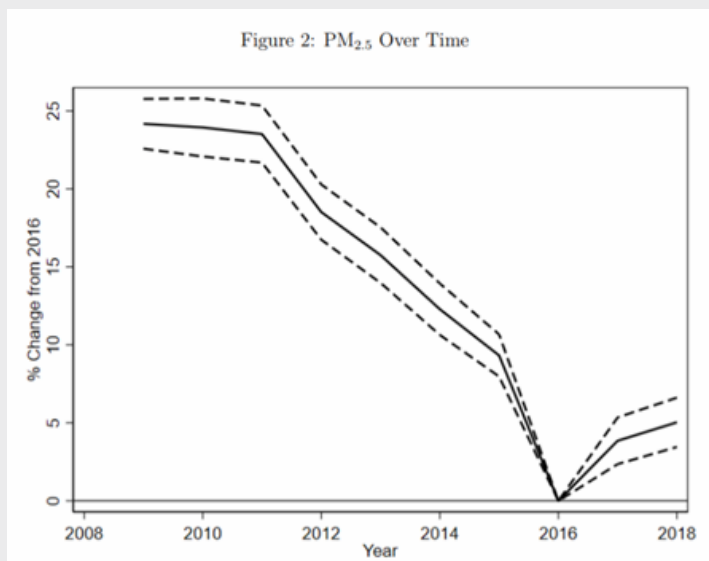
[Career Opportunities](#)

National Concentrations of PM_{2.5} have Increased in the Past Few Years

For the past several decades, air quality in the United States has generally improved. Nationwide and regional concentrations of particulate matter, ozone, and other criteria pollutants have generally dropped for decades. A recent report by the National Bureau of Economic Research looked at particulate matter trends over the past decade and found that national yearly average concentrations of PM_{2.5} have dropped year after year. However, this trend stopped in 2016, and concentrations have nationally increased 5% since then (see plot labeled Fig. 2 below). Increases in PM concentrations were highest in the west, in part due to wildfires, while in the east concentrations have remained stable (but not decreased) since 2016.

Report can be found here:

<https://www.nber.org/papers/w26381.pdf>



Read more:

<https://www.nytimes.com/interactive/2019/10/24/climate/air-pollution-increase.html> •

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Key Dates and Reminders



OCTOBER 5–9, 2020

Raleigh Convention Center | Raleigh, NC

In preparation for the 2020 Annual AAAR meeting in Raleigh:

Abstract Submission
Deadline **April 19, 2020**
(no extensions)

Early Bird Registration
Deadline **July 10, 2020**

Late Breaking Abstract/
Poster Deadline
July 10, 2020

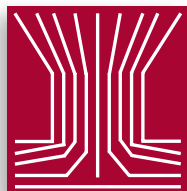
Hotel Room Cut-off Date
September 6, 2020

Organizational Members

*AAAR would like to thank the companies that support us as
Organizational Members:*



CAMBUSTION



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