CENTER FOR AEROSOL SCIENCE AND TECHNOLOGY
UNIVERSITY OF MIAMI

NEWSLETTER

August 2025
Vol 1 Issue 1

Highlights

Awards

- CAST faculty receive NSF CAREER and ASEMFL Rising Star Awards

Research Highlights

- Publications on aerosol-cloud impacts, African smoke and climate warming and biomass burning-related new particle formation

Strategic Initiatives

- Sub-Saharan smoke and dust monitoring campaign in Barbados
- Low-cost sensors for methane monitoring in landfills
- Quantifying the impact of air pollution on sleep and cardiovascular risk
- Installation of an advanced laser-system for nanomaterial manufacturing

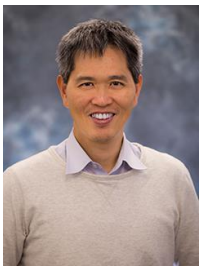
Other News

- New faculty joins CAST
- CAST workshop 2026

CAST Newsletter Submissions

Please send news, awards, publications, and other contributions to the newsletter to Prof. C Y Wu at cxw964@miami.edu. The next newsletter will appear in Feb 2026.

Message from the Center Director



Since its establishment in 2022, the Center for Aerosol Science and Technology (CAST) has experienced remarkable growth, bringing together scholars and students from Engineering, Atmospheric Sciences, and the Medical School. CAST fosters interdisciplinary research and education with broad applications in air quality, climate change, energy, public health, materials synthesis, space missions, and agriculture. We are excited to share the inaugural issue of the CAST newsletter and look forward to engaging with individuals passionate about aerosol science and technology—both here in South Florida and around the world.

Prof. Chang-Yu Wu

CAST conducts another successful annual workshop

CAST hosted the third annual workshop from January 8-10 this year. Over 80 participants from academia, industry, and government agencies attended the three-day event. The workshop included several fascinating lectures on topics like nanoparticle characterization, nanotechnology, biomass burning aerosols, and indoor air quality. A special highlight of the workshop was the hands-on demonstrations of advanced aerosol characterization techniques, showcasing cutting-edge instrumentation. The workshop also included a poster presentation session and panel discussions. Speakers this year included both well known researchers from Purdue, University of Georgia, USEPA, Embry-Riddle, and Baylor University, and industry professionals from Netzch and Malvern Panalytical.

CAST Newsletter will be published twice a year: in February and August. For information on how to join the mailing list, please send an email to Prof. C Y Wu at cxw964@miami.edu

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Awards!

Yang Wang received NSF CAREER Award!

Dr. Yang Wang, an Assistant Professor in the Department of Chemical, Environmental and Materials Engineering, received the National Science Foundation (NSF) CAREER Award with his project "Quantifying the Emission and Health Impacts of Aerosols Generated from Southeast U.S. Wetland Biomass Burning." His research group - Particle Measurement and Technology Laboratory (PMTL) - will use novel combustion and toxicology assessment platforms to examine the aerosols generated from Southeast U.S. wetland biomass burning. The Southeast U.S. wetlands have a high fire frequency and intensity due to the excessive growth of wetland biomass, but their impacts are not fully understood. The project results will assist the management of wetland fires and improve predictions of their influences on the environment and public health. (https://news.miami.edu/coe/stories/2025/07/nsf-awards-boost-research-on-aerosols-and-concrete.html)

Cassandra Gaston received the ASEMFL Rising Star Award!

Dr. Cassandra Gaston, an Associate Professor in the Department of Atmospheric Sciences, was recognized by the Academy of Science, Engineering and Medicine of Florida as a Rising Star in Science for her research in climate, air quality, and biogeochemical impacts of African dust on the Caribbean and the Americas. The ASEMFL Rising Star award recognizes the importance of new investigators whose work shows great promise in addressing critical issues towards ensuring the growth and success in its mission and are potential future ASEMFL inductees. Gaston is the principal investigator for the Barbados Atmospheric Chemistry Observatory, which was established 50 years ago to document the transport of dust from Africa to the Caribbean and the Americas to determine its impact on clouds, storms, and ecosystem health in the Atlantic Ocean and Amazon Rainforest. Her work is important for understanding how atmospheric deposition can impact carbon sequestration.

Student Achievements

Kapiamba Fabrice, a recent PhD graduate advised by Yang Wang was awarded the Axel Hendrickson Scholarship by the Florida Section of the Air & Waste Management Association (A&WMA)

Weixing Hao, a recent PhD graduate advised by Yang Wang received the Outstanding Research Award from the Department of Chemical, Environmental, and Materials Engineering

CAST students won big in both undergraduate and graduate categories of the Student Poster Competition held as a part of the AAEES Kappe Lecture 2025. In the undergraduate category, Avi Friedman (advised by Chang Yu Wu) won the second place, and Jessica Austin (advised by Chang-Yu Wu) and Emma Gonsalves (advised by Helena Solo-Gabriele) won the third place. In the graduate category, Mohammad Washeem (advised by Chang Yu Wu), Rouyu Zhang and Chanakya Ramesh (advised by Yang Wang) won the first, second and third places.

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CAST Research Highlights

Weakening the CO_2 Greenhouse Effect via Aerosol Injection

A team led by Dr. Brian J. Soden at the Rosenstiel School of Marine, Atmospheric, and Earth Science, University of Miami, proposes using absorbing aerosols in the upper stratosphere to warm the CO_2 emission level and enhance infrared cooling. Model simulations suggest this method could be more efficient than traditional scattering techniques. Published in Nature Communications Earth & Environment, the study highlights a promising mechanism for climate change intervention (https://www.nature.com/articles/s43247-025-02466-z)

Refined Estimate of Aerosol–Cloud Climate Impact

Another study by Dr. Brian J. Soden's group at the University of Miami, published in Atmospheric Chemistry and Physics, finds that aerosol–cloud interactions exert a smaller and less uncertain radiative forcing than previously thought. (https://doi.org/10.5194/acp-25-7299-2025)

Links between African Fire Smoke and Regional Climate Warming

Led by Dr. Paquita Zuidema at the Rosenstiel School of Marine, Atmospheric, and Earth Science, University of Miami, this study finds that while biomass burning in southern Africa remains steady, changes in smoke transport pathways and cloud cover over the southeast Atlantic have made the aerosol radiative effect more warming over the past two decades. (https://www.sciencedirect.com/science/article/pii/S0048969725001408?via%3Dihub#bi0005)

New Particle Formation Linked to African Biomass Burning Over Southeast Atlantic

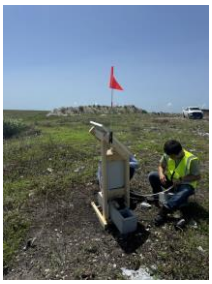
A study led by Dr. Yang Wang at the Department of Chemical, Environmental & Materials Engineering, University of Miami, reports new particle formation events over the southeast Atlantic during the African biomass burning season. These particles, which are transported to the surface, can affect the regional cloud process. (https://doi.org/10.1029/2024GL113235)

Strategic Initiatives

ONR-sponsored MAGPIE campaign in Barbados

Dr. Cassandra Gaston's team conducted the final ONR-sponsored MAGPIE campaign. They deployed the single particle mass spectrometer to Barbados for the first time. Wintertime dust was sampled and so was a major intrusion of smoke from sub-Saharan Africa. This smoke event was unprecedented in terms of its magnitude. Dr. Sujan Shrestha was the lead from the Gaston Lab for the sampling and is currently analyzing the data. They hope to learn more about how these dust and smoke events impact both air quality on the island as well as clouds and biogeochemical cycles.

Development of a Cost-Effective Methane Sensor Node for Landfill Monitoring



Understanding methane (CH_4) distribution is key to detecting leaks and estimating emissions, especially at large sources like landfills. To reduce reliance on costly instruments, Dr. Jiayu Li's team developed low-cost sensing nodes with metal oxide sensors, environmental monitors, data logging, telemetry, a 12V battery, and solar power in waterproof enclosures. Ten units are currently deployed at a Florida landfill, transmitting real-time data. The next phase includes site-specific calibration using reference instruments and weather data to identify CH_4 hotspots and patterns. This field data will support accurate methane emission while enhancing monitoring and mitigation efforts.

Strategic Initiatives (Contd.)

Mitigating sleep and cardiovascular risk in high-exposure settings

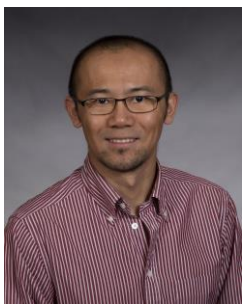
Underserved communities in South Florida face high indoor air pollution due to poor housing, limited ventilation, and traffic proximity. This exposure may worsen sleep-disordered breathing (SDB) and increase cardiac arrhythmia risk through autonomic dysfunction. With support from the Southeast Collaborative Pilot Award Program and in partnership with CAST, Dr. Trishul Siddharthan and Dr. Dipan Karmali from the Division of Pulmonary, Critical Care, and Sleep Medicine will study this link. Using home-based sleep studies and personal air monitors, we aim to quantify the impact of pollution on autonomic health. This research will help close a critical gap in environmental health equity and guide interventions in high-risk communities.

Installation of high-speed high-power laser at Nano-BioMaterials Lab for Energy, Energetics & Environment (nbml-E3): A DURIP project in CEME Department

The nbml-E3 group led by Dr. Dibyendu Mukherjee announces the installation of a high-power Amphos 8000 ultrafast laser system (Trumpf, Germany), funded by an Air Force DURIP project. Operating at 1030 nm with 200 W output, 10–20 kHz repetition rate, and 10–20 ns pulses, it features stable acousto-optic modulation and plug-and-play readiness for future 40 MHz integration. This upgrade enhances nbml-E3's LASiS technique, previously limited to 0.3 W at 10 Hz, dramatically scaling nanoparticle production from ~0.6 µg/s to 200–220 g/hr. The milestone instrumentation paves the path for a futuristic Programmable-LASiS (Pro-LASiS) system, an AI-driven nanomanufacturing platform proposed under the DURIP project for large-scale delivery of advanced energetic nanomaterials for defense's national security missions.

Other News

Dr. Siyuan Wang joined RSMAES as an Associate Professor



Dr. Siyuan Wang joined the Rosenstiel School of Marine, Atmospheric, and Earth Sciences (RSMAES) at the University of Miami in August 2025 as an Associate Professor, after working at the Cooperative Institute for Research In Environmental Sciences (CIRES)/National Oceanic and Atmospheric Administration (NOAA) as a research scientist for 5 years. Dr. Wang uses a variety of observations (e.g. aircraft, satellite), modeling tools (from global to regional), and novel techniques (e.g. artificial intelligence/machine learning) to study the chemical and physical processes in the atmosphere and their broader impacts on air quality and climate. Dr. Wang received his Ph.D. from the Hong Kong University of Science and Technology, and postdoctoral training at the University of Michigan, Ann Arbor and the National Center for Atmospheric Research (NCAR).

CAST workshop 2026

CAST will be hosting the 4th Miami Workshop on Aerosol Science and Technology - Summer School in Winter on January 14 to 16, 2026. The 2026 CAST Workshop is supported by the National Science Foundation (Award 2447193). A $550 travel fund is available per student attendee on a first-come, first-served basis. For details, please contact Dr. Yang Wang at yangwang@miami.edu. Attendees of the CAST 2026 workshop will also receive 2.0 University of Miami Continuing Education Units (CEUs). (https://cast.miami.edu/workshop/workshop-2026/workshop-overview/index.html)