

MMM SEMINAR SERIES



Where There's Smoke, There's... Severe Weather? The Radiative Impact of Western and Canadian Wildfires on Hail and Tornado Formation in the Midwest

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Wildfires across North America, particularly in the Western U.S. and Canada, have increased in frequency and severity in recent decades, largely driven by climate change and land management practices. These fires release massive amounts of aerosols and gases, which are transported over vast distances, influencing air quality and atmospheric processes far from the source. While significant attention has been given to local impacts of wildfires, there is less focus on the radiative effects of transported smoke and their role in shaping severe weather patterns downwind.

This research examines the radiative influence of wildfire smoke, particularly black carbon (BC) aerosols, on hail and tornado formation in the Midwest. Using reanalysis and satellite data, we explore how these aerosols modify key atmospheric parameters such as Convective Available Potential Energy (CAPE), Convective Inhibition (CIN), and wind shear, creating conditions favorable or suppressive for severe weather. Additionally, the study focuses on aerosol-cloud interactions during the 2023 wildfire season, analyzing how black carbon and other aerosol components impacted convective storms in Wisconsin and neighboring states.

Through radiative transfer modeling and the use of advanced machine learning techniques, this research uncovers seasonal and regional trends in aerosol concentrations and predicts their future impact on weather patterns. Understanding the influence of transported smoke on severe weather is vital for improving forecasting accuracy, protecting public health, and addressing environmental justice concerns, particularly in vulnerable communities affected by both poor air quality and heightened severe weather risks.

Thursday, 31 October 2024, 2:00PM

Refreshments 1:45PM

Please also join colleagues for refreshments and informal discussion after the seminar until 3:30pm

NSF NCAR-Foothills Laboratory, 3450 Mitchell Lane
FL2-1022, Large Seminar

Seminar will also be live webcast

<https://operations.ucar.edu/live-mmm>

Participants may ask questions during the seminar via Slido.