Johns Hopkins University

Center for Environmental & Applied Fluid Mechanics

3:00 PM, Friday, October 24, 2025
Gilman Hall 50
Zoom: https://wse.zoom.us/j/93762992307
Link for Fall 2025 recordings

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"Using Turbulence, Ultraviolet Radiation, and Atmospheric Chemistry to Understand Lightning Initiation"

Abstract: Lightning is one of the oldest phenomena on Earth. Much is known about the turbulent and microphysical processes leading to separate electric charge regions in the thunderstorm and about the properties of lightning itself. However, how that charge distribution leads to lightning is still unknown. In particular, the maximum observed thunderstorm electric fields of ~150 kV m^{-1} are an order of magnitude smaller than the 3,000 kV $^{m-1}$ required to cause electrical breakdown in air. In a leading lightning initiation hypothesis, storm turbulence moves oppositely charged particles in the cloud closer together, creating intense, small scale electric field enhancements. These enhancements cause weak electrical discharges, some of which develop into lightning flashes. Weak discharges also emit detectable ultraviolet radiation, which in turn initiates extreme chemistry not found elsewhere in the lower atmosphere. Thus, studying turbulence, ultraviolet radiation, and atmospheric chemistry together furthers our understanding of lightning initiation.

Bio: I am currently an Assistant Research Professor in the Department of Meteorology and Atmospheric Science at Penn State, and I received my PhD from the same in 2022. Prior to graduate school, I received my undergraduate degree in chemistry from Ohio Wesleyan University and worked for several years as an analytical chemist at Charles River Laboratories. My primary research interests are atmospheric chemistry and atmospheric electricity.

For more details, visit: https://www.met.psu.edu/directory/jena-jenkins

Hosted by: Prof. Rui Ni (MechE)