

Bruce Podwal Seminar Series

The City College
of New York

Fluid Dynamics of the Urban Atmosphere

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Department of Civil Engineering and
Engineering Mechanics, Columbia University

12:30– 1:30 pm, Tue., Apr 9, 2024
Civil Engineering Department, Room 105, Steinman Hall

<https://ccny.zoom.us/j/85839128635?pwd=YXQ4TW9VY1RncVF1UjN4R1g0MkhFQT09>

Abstract The rapid growth of the urban population and the looming threat of climate change has prompted a stronger focus on the identification of optimal strategies to make our cities more sustainable and resilient. Being able to understand and predict how the urban form and its materials properties affect the exchange of momentum, heat, moisture, and gases with the atmosphere is key towards the development of these strategies. These exchanges are regulated by the interaction of the urban environment with atmospheric winds, which takes place over a wide continuum of temporal and spatial scales and poses a formidable challenge our conceptual understanding and ability to model it. This presentation will discuss the dynamics of flow within idealized and realistic urban environments, delving into persisting challenges from both a theoretical, numerical, and observational perspective, and outlining ongoing research efforts aimed at addressing these challenges. The focus will be on the dynamics of canopy flows, structural changes in canopy flow turbulence induced by surface heterogeneity and flow unsteadiness, and the impact of surface uncertainties on model predictions.

Biography: Dr. Giometto is an Assistant Professor in the Department of Civil Engineering and Engineering Mechanics at Columbia University and an Amazon Visiting Academic. He received his Ph.D. in Civil and Environmental Engineering from Braunschweig TU University and the University of Florence in 2014, and in 2016 he earned a second PhD in Mechanical Engineering from École Polytechnique Fédérale de Lausanne. Before joining Columbia University in 2018, he held postdoctoral positions at the University of British Columbia and at the Center for Turbulence Research at Stanford University. He studies both fundamental and applied problems related to fluid dynamics and turbulence, with an emphasis on atmospheric flows in urban areas. Marco is the recipient of several awards, including an Early CAREER award from the National Science Foundation, an Early Career Program Award from the Army Research Office, and a Young Investigator Award from the Office of Naval Research.

