JOHNS HOPKINS
Center for Environmental
& Applied Fluid Mechanics

Friday, February 15, 2019
3:00 PM, 132 Gilman Hall

"Particles and Snowflakes Falling Through Turbulence"

Presented by Prof. Filippo Coletti
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The fall speed of heavy particles suspended in a turbulent flow is an important parameter in the modeling of numerous natural phenomena and industrial applications. The question of how the turbulence affects the particle settling remains, however, unanswered. This is of critical importance in meteorology, where an accurate knowledge of the fall speed of hydrometeors, from rain drops to snowflakes, is a necessary pre-requisite for reliable precipitation forecasting. Previous investigations identified several mechanisms which may alter particle settling rate as compared to the still-fluid terminal velocity, but different studies often show large qualitative discrepancies. I will present laboratory and field experiments demonstrating how turbulence may lead to a multi-fold increase in the fall speed of heavy particles in air. In the laboratory, we use a unique apparatus in which hundreds of randomly actuated jets create a large volume of homogeneous turbulence, simultaneously measuring both air and particle motion via laser imaging. In the field, we use high speed cameras to track snowflakes falling through the atmospheric surface layer. The analysis highlights the dominant temporal and velocity scales of the process, and paves the way towards parameterizations of weather forecasting models.