Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Experimental study of the effect of turbulence on the dynamics of sedimenting inertial particles[1] COLIN BATESON, ALBERTO MOLINA, ALBERTO ALISEDA, University of Washington, HOSSEIN PARISHANI, LIAN PING WANG, University of Delaware, WOJCIECH GRABOWSKI, NCAR — Understanding the dynamics and mutual interactions of droplets in turbulent flows is important to many engineering and environmental problems including fuel injector sprays, warm rain formation, and the mass and energy transfer between the ocean and the atmosphere. Specifically, the collision and coalescence in turbulent flows is considered a key element for the growth of condensation droplets into a size range where gravitational settling mechanism can take over to produce rain drops. We study experimentally the effect of turbulence on the collision-coalescence of water droplets over a parameter range relevant to rain formation. Droplets in a size range between 1 and 40 microns are injected inside a low speed wind tunnel through an array of atomizers located at the nodes of a turbulence-inducing grid that covers the tunnel's cross section with uniform spacing. The evolution of the droplet size distribution, concentration and settling velocity is measured along the wind tunnel's test section. We will present a comparison between experimental measurements of the one and two dimensional droplet radial distribution functions and collision statistics against equivalent quantities computed from a three dimensional numerical simulation performed and presented here by Wang et al.

[1]Supported by NSF grant ATM-0731248.

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Date submitted: 10 Aug 2009 Electronic form version 1.4