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Particles and snowflakes falling through turbulence FILIPPO COLETTI, University of Minnesota — The question of how turbulence affects the settling of small heavy particles has proven surprisingly hard to answer. Previous investigations identified several mechanisms by which turbulence may alter the particle settling rate as compared to the still-fluid terminal velocity, but different studies often show large discrepancies. This is especially problematic in meteorology, where an accurate knowledge of the precipitation fall speed is a prerequisite for reliable weather forecasting. I will present laboratory and field measurements that demonstrate how turbulence may lead to a multifold increase of the particle fall speed. In the laboratory, a large chamber is used where hundreds of randomly actuated jets create a large volume of homogeneous air turbulence, and in which flow tracers and inertial particles are simultaneously tracked by laser imaging. Clusters of particles are identified and described in their self-similar nature. In the field, snowflakes settling in the atmospheric surface layer are imaged and tracked during nighttime snowfalls, using stage lights and high speed cameras. The Lagrangian acceleration statistics show that small and compact snowflakes (graupel) follow the classic phenomenology of inertial particles in homogeneous turbulence.

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