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Experimental study of droplet condensational growth in a wet/dry turbulent mixing layer RYAN KEEDY, ALBERTO ALISEDA, University of Washington — Droplet condensational growth has been experimentally studied as a function of supersaturation and turbulence. The experimental setup consists of two coaxial round jets, with a moist, warm inner round jet, surrounded by an annular sheath of cold air. Supersaturation is controlled by the relative humidity and temperature of the two streams, while the turbulence levels are determined by the shear at the interface between the two jets. Turbulent mixing of the supersaturation field, as well as particle clustering in regions of low vorticity, are expected to lead to large inhomogeneities in the growth rate and resulting discrepancies in the particle size distribution. Analysis of large data sets of droplet behavior at different locations along the mixing layer and under different conditions of water vapor concentration, temperature and mixing intensity are used to understand the dynamics of the interaction between the turbulent eddies and condensational droplet growth. A Phase Doppler Particle Analyzer (PDPA) is used to collect statistics of droplet growth, and to characterize the turbulent velocity field. The goal of this study is to improve the understanding of the competition between turbulent mixing replenishing the water content around the droplet and depletion of the vapor surrounding the droplet by condensation, and to develop quantitative models that can be applied to the problem of edge mixing in clouds.

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