OBSERVATIONS OF THE MICROSCALE VARIABILITY OF PRECIPITATION USING AN IMAGING RADAR

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For many years, spatial and temporal inhomogeneities in precipitation fields have been studied using scanning radars, cloud radars, and distrometers, for example. Each measurement technique has its own advantages and disadvantages. In the present study, an imaging boundary layer radar is used to investigate the effects of turbulence on the formation of rain. Conventional profiling radars point vertically and collect data while the atmosphere advects across the field of view. Invoking Taylor's frozen turbulence hypothesis, it is possible to construct time-history data which are used to study the structure and dynamics of the atmosphere. Of course, the data obtained in this fashion are located on the two-dimensional plane aligned with the horizontal wind. A true three-dimensional view of the atmosphere can be obtained from imaging radars, such as the Turbulent Eddy Profiler (TEP), which was developed by the University of Massachusetts (Mead et al., *J. Atmos. Oceanic Technol.*, **15**, 849-859, 1998). This unique 915-MHz radar has up to 64 spatially separated receive elements, each with an independent receiver. As such, it is possible to use this radar to implement sophisticated imaging/beamforming algorithms with high angular resolution and clutter rejection capabilities (Palmer et al., *Radio Sci.*, **33**, 1585-1598, 1998). Using data from the TEP radar collected in June 2003, it will be shown that boundary layer turbulence can have either a constructive or destructive effect on the formation of precipitation. Evidence will also be provided which shows that this effect can be enhanced by updrafts in the wind field.

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