TITLE: Investigation on the impact of environmental parameters on ship-based observations of trade wind shallow cumuli and precipitation.

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During the EUREC4A campaign, a synergy of ship-based remote sensing instruments deployed onboard the research vessel (RV) Maria S. Merian collected high-resolution observations of clouds, precipitation, and atmospheric boundary layer (ABL). Various data papers describe in detail the datasets collected. This work uses data from the W-band cloud radar, the Micro Rain Radar (MRR-PRO), the Atmospheric Raman Temperature and Humidity Sounder (ARTHUS), the wind lidar, and the radiosoundings.

This work statistically characterizes clouds and precipitation properties by looking at specific observables collected during the campaign. We derive the W-band radar moments statistics (CFADs), the rain rate, and virga reflectivity profiles. We also display the relation between the W-band radar reflectivity and the radar skewness, revealing insights into the precipitation onset.

We investigate how the statistical distributions obtained for each of the observables mentioned above vary as a function of some environmental parameters like the columnar humidity, the turbulence, quantified in terms of eddy dissipation rate, and the vertical air motion.

The analysis aims to identify conditions and parameters that alter the cloud properties and precipitation characteristics to foster scientific knowledge of such processes and improve future model evaluations.