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Analysis of 35 GHz Cloud Radar polarimetric variables to identify stratiform and convective precipitation.

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This study is performed using vertical profiles of radar measurements at 35GHz, for the period going from 29th of February to 1rst October 2016, at the Chilbolton observatory in United Kingdom. During this period, more than 40 days with precipitation events are investigated. The investigation uses the synergy of radar reflectivity factors, vertical velocity, Doppler spectrum width, and linear depolarization ratio (LDR) to differentiate between stratiform and convective rain events. The depth of the layer with Doppler spectrum width values greater than 0.5 m s-1 is shown to be a suitable proxy to distinguish between convective and stratiform events. Using LDR to detect the radar bright band, bright band characteristics such as depth of the layer and maximum LDR are shown to vary with the amount of turbulence aloft. Profiles of radar measurements are also compared to rain gauge measurements to study the contribution of convective and stratiform rainfall to total rain duration and amount. To conclude, this study points out differences between convective and stratiform rains and quantifies their contributions over a precipitation event, highlighting that convective and stratiform rainfall should be considered as a continuum rather than a dichotomy.