

13.20 PRECIPITATION VARIABILITY BETWEEN AFTERNOON MIXED LAYER AND FREE ATMOSPHERE CLOUDS IN SEMI-ARID SOUTHEAST ARIZONA

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Precipitation in semi-arid regions is highly variable in space and time, and is subject to significant inter-annual variability, fluctuating at multi-decadal time scales due to oceanic sea surface temperature (SST) variations (e.g. ENSO). For the southwest US, the majority of precipitation results from convectively generated high-intensity rainfall that occurs during the warm season as part of the North American Monsoon (NAM).

The current work focuses on NAM precipitation variability observed within the ~149 km² Walnut Gulch Experimental Watershed (WGEW) in southeast Arizona. Within WGEW, detailed high-resolution precipitation observations have been performed since the mid-1950's. For the summer of 2017, additional information of on spatial variations of precipitation and rain drop size variations was investigated by installing an additional ceilometer, two vertically pointing radars, multiple disdrometers and gps-met observations.

The current work will present some detailed analyses of these observations. We will focus specifically on afternoon precipitation events, distinguishing between those events originating from clouds formed on top of the mixed boundary layer and those within the free atmosphere above. Between both types of clouds, a clear distinction in surface precipitation and rain drop size characteristics was observed, with the most intense rainfall intensities originating from mixed layer clouds. However, for both types of precipitation, the reflectivity profile, as observed by vertically pointing radar, shows similar reflectivity profile characteristics. The elevated terrain of the southwest US is known to pose a challenge for operational weather radar, where for many locations, observations are taken at higher elevation. In case information on the original cloud generating mechanisms would be known, potentially improved surface precipitation estimates can be obtained.
