

Systematic evaluation of GPM DPR and WSR-88D over the contiguous United States

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Abstract

Ground-based polarimetric radars - WSR-88D network in the US - underpin nationwide precipitation observations and estimates with advanced Doppler capability. Alternatively, spaceborne radar - GPM DPR (Global Precipitation Measures Dual-frequency Precipitation Radar) - has an unprohibited downward view and higher vertical resolution, relative to ground-based radars. The synergy between space-borne and ground-based radars creates promising opportunities for observing and probing three-dimensional clouds and precipitation structures. However, it is a prerequisite to fully understand and quantify the similarities and differences between the WSR-88D and GPM DPR. This study for the first time generates nationwide comparisons at 140 WSR-88D radar sites from 2014 to 2020. Systematic differences are found across the ground radar sites with an average of ~ 2 dB. We suspect that different calibration standards, signal attenuation, and matching methods are accountable for such differences. This study by no means judges the relative accuracy of the two system but rather hope to draw attention to the cautious use of GPM DPR and WSR-88D data and encourage future investigations to alleviate the systematic bias.