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Comparison of the Radar Observables between NASA's S-band Polarimetric Radar (NPOL) and two-dimensional video disdrometer (2DVD)

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The NASA's S-band polarimetric radar (NPOL) has recently participated three Global Precipitation Measurement (GPM) mission Ground Validation (GV) field campaigns: Iowa Flooding Studies (IFloods) between April-June 2013, Integrated Precipitation Hydrology Experiment (IPHEx) between May-June 2014, and Olympic Mountain Experiment (OLYMPEx) between November 2015-January 2016. These field campaigns represent diverse climate regimes over flat and orographically complex terrain. The measurement fields present also different characteristics in terms of instruments arrangement and area covered.

The ground based observations in these field campaigns also included a number of vertically-pointed K-band radar (MRR), two-dimensional video disdrometers (2DVD) and PARticle Size VELocity (PARSIVEL2) disdrometers, tipping bucket and weighing bucket gauges. The NPOL and ground instruments were also operated at Wallops Island, Virginia between the field campaigns. The disdrometers and MRR provide the microphysical characteristics of precipitation at the surface and in a vertical column, respectively. They are also an important asset for cross comparison of the NPOL observables.

This study determines the level of agreement between radar observables and derived rain and DSD parameters through the simultaneous measurements of NPOL, the 2DVDs and PARSIVEL2s. The ground clutter and bright band on NPOL observations at its first and second elevations, respectively, was clearly identified through statistical comparisons (e.g. Person correlation coefficient, bias and absolute bias) of radar reflectivity and this has a pronounced role in radar based rainfall estimate. The MRR observations which provide the vertical profile of reflectivity, can be used to correct NPOL radar rainfall mapping.