7.15 SYNERGY OF GPM AND GROUND-BASED RADAR OBSERVATIONS FOR PRECIPITATION ESTIMATION AND DETECTION OF MICROPHYSICAL PROCESSES

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As successor to the TRMM mission the Global Precipitation Measurement core satellite (GPM) operates with a Ka-band and Ku-band Dual-frequency Precipitation Radar (DPR). This is the first spaceborne DPR and allows important global insights into three-dimensional precipitation structures from space. The polarimetric X-band research radar in Bonn (BoXPol), Germany, is part of an international network for ground validation of the GPM satellite. The nationwide German C-band radar composit of the German Weather Service (RADOLAN) and a vertically pointing micro rain radar (MRR) are used to evaluate the satellite based precipitation estimates, rain type and phase partitioning (solid, liquid, mixed phase). Three years of comparison (2014-2017) between GPM DPR derived near surface rain rates and the ground-based estimates from RADOLAN show high correlations. The near surface rain rates and reflectivities from the single and dual-frequency satellite products reveal robust correlations in summer but higher variability in winter. This can be attributed to reduced DPR performance for solid precipitation estimates which directly depends on the melting layer detection. Consequently, GPM-based vertical products like the bright band height and thickness used for phase partitioning require an in-depth evaluation. The measurements of the twin polarimetric X-band radars in Bonn and Jlich (JuXPol) allow a more reliable and robust detection of the bright band which is compared with GPM-based results. The use of the temporal evolution of quasi vertical profiles (QVP) sustain the polarimetric information and offer an optimal detection of phase partitioning and the melting layer during the development of precipitation systems. Furthermore, the matching method of open source software wradlib is used to obtain a direct and qualitative statement about the measurement inaccuracies between the different resolutions of both observation systems.