Geophysical Research Abstracts
Vol. 20, EGU2018-15907, 2018
EGU General Assembly 2018


# Comparison of GPM-CO and Ground-Based Radar Retrieval of Mass-Weighted Mean Rain Drop Diameter at Mid-Latitude

Leo Pio D'Adderio (1), Gianfranco Vulpiani (2), Federico Porcù (3), Ali Tokay (4), and Robert Meneghini (5)

(1) University of Ferrara, Physics and Earth Science, Physics and Earth Science, Ferrara, Italy (dadderio@fe.infn.it), (2) Department of Civil Protection, Presidency of the Council of Ministers, Rome, Italy, (3) Department of Physics and Astronomy, University of Bologna, Bologna, Italy, (4) Joint Center for Earth Systems Technology, University of Maryland Baltimore County and NASA Goddard Space Flight Center, Greenbelt, Maryland, (5) NASA Goddard Space Flight Center, Greenbelt, Maryland

One of the main goals of the National Aeronautics and Space Administration (NASA)/ Japan Aerospace Exploration Agency (JAXA) Global Precipitation Measurement (GPM) mission is to retrieve parameters of the raindrop size distribution (DSD) globally. As a standard product of the dual-frequency Precipitation Radar (DPR) on board GPM Core Satellite, the mass-weighted mean diameter, Dm, and the normalized intercept parameter, Nw, are estimated in three dimensions at the resolution of the radar. These are two parameters of the three parameter gamma model DSD adopted by the GPM algorithms.

This study investigates the accuracy of the Dm, retrieval through a comparative study of C-band ground radars (GR) and GPM products over Italy. The reliability of ground reference is tested by using two different approaches to estimate Dm,, which show a slight discrepancy only at larger Dm, values. The results show good agreement between the ground based and space-borne derived Dm, with an absolute bias being generally lower than 0.5 mm over land in stratiform precipitation for the DPR algorithm, and the combined DPR-GMI (GPM Microwave Imager) algorithm. For the DPR-GMI algorithm, the good agreement extends to convective precipitation as well, while it degrades noticeably for the DPR algorithm. Estimates of Dm, from the DPR High Sensitivity Ka-band (HS) data show slightly worse results. Both DPR HS and Matched Scan (MS – Ka- and Ku-band) show the presence of saturated Dm,.

A sensitivity study indicates that the accuracy of the Dm, estimation is independent of the height above surface and the distance from the ground radar. On the other hand, a non-uniform precipitation pattern (interpreted both as high variability and as a patchy spatial distribution) within the DPR footprint is usually associated with a significant error in the DPR-derived estimate of Dm,.