A Performance Analysis of the IMERG satellite precipitation product using satellite and ground-based radars as benchmark

Presenter: Sana KHAN
Address: 4400 University Drive
Nguyen Engineering Building, Suite 2249, MS 6C1
George Mason University
Fairfax, VA 22030
Country: United States of America
Email: skhan51@gmu.edu
Authors: Sana Khan (1) and Viviana Maggioni (1)
Affiliations: (1) George Mason University, Fairfax, VA, USA
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The quantification of uncertainties associated with Integrated Multi-satellitE Retrievals for Global Precipitation Mission (IMERG) satellite product is important for its use in numerous fields, such as hydrological modeling, land data assimilation systems, and water management policies. It fuses information from several satellite microwave and infrared precipitation estimates, merged with ground gauge information. Contiguous United States (CONUS) is used as a study area for studying the uncertainties associated with IMERG. This research identifies the viability of Multi Radar Multi Sensor system (MRMS) and Dual frequency Precipitation Radar (DPR) to be used as reference for IMERG error estimation. Moreover, the dependence of uncertainties associated with IMERG final product on seasonality and climatology is evaluated against MRMS over CONUS. Statistical parameters such as hit bias, correlation, and root mean square error are computed. Different detection measures such as false alarm rate and probability of detection are also investigated and presented in terms of Performance and Taylor diagrams. It is observed that the selection of the best reference is critical for correctly understanding and interpreting errors in satellite precipitation products. The Koppen climatic regions and four different seasons (JJA, SON, DJF, and MAM) are used to investigate the dependence of all the error components on climatology and seasonality.