

Evaluation of IMERG Performance at Estimating the Rainfall Properties through Convective and Stratiform Rain Events in a Semi-Arid Region of Mexico

Authors : Eric Muñoz de la Torre, Julián González Trinidad, Efrén González Ramírez

Abstract : Rain varies greatly in its duration, intensity, and spatial coverage, it is important to have sub-daily rainfall data for various applications, including risk prevention. However, the ground measurements are limited by the low and irregular density of rain gauges. An alternative to this problem are the Satellite Precipitation Products (SPPs) that use passive microwave and infrared sensors to estimate rainfall, as IMERG, however, these SPPs have to be validated before their application. The aim of this study is to evaluate the performance of the IMERG: Integrated Multi-satellitE Retrievals for Global Precipitation Measurement final run V06B SPP in a semi-arid region of Mexico, using 4 automatic rain gauges (pluviographs) sub-daily data of October 2019 and June to September 2021, using the Minimum inter-event Time (MIT) criterion to separate unique rain events with a dry period of 10 hrs. for the purpose of evaluating the rainfall properties (depth, duration and intensity). Point to pixel analysis, continuous, categorical, and volumetric statistical metrics were used. Results show that IMERG is capable to estimate the rainfall depth with a slight overestimation but is unable to identify the real duration and intensity of the rain events, showing large overestimations and underestimations, respectively. The study zone presented 80 to 85 % of convective rain events, the rest were stratiform rain events, classified by the depth magnitude variation of IMERG pixels and pluviographs. IMERG showed poorer performance at detecting the first ones but had a good performance at estimating stratiform rain events that are originated by Cold Fronts.

Keywords : IMERG, rainfall, rain gauge, remote sensing, statistical evaluation

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