

Spatio-temporal characteristics of intense southwest monsoon rainfall events as represented in the newly developed high-resolution gridded rainfall dataset of the Philippines

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Intense rainfall events have historically left the Philippines with disastrous impacts. To investigate such events, reliable and fine resolution gridded rainfall data is vital to better show its extent. In this study, a newly developed high-resolution (~1km x ~1km) observation-based gridded daily rainfall dataset for the Philippines was utilized. The dataset uses 48 PAGASA synoptic stations with >80% available data for the 5-year analysis period (2008-2012). The aforementioned in situ observation data were merged with satellite rainfall estimates from the Tropical Rainfall Measuring Mission (TRMM) using various merging-interpolation techniques. Standard and supplementary quality control methods were implemented prior to performing the merging-interpolation process. Validation results comparing historical daily rainfall data with available merging-interpolation techniques show that simple bias adjustment merging method and modified Shepard interpolation technique perform best among other combinations. Comparison with similar global satellite rainfall datasets showed that the constructed gridded rainfall dataset successfully represents spatial rainfall variation patterns within the vicinity of the Philippines. Three (3) case analyses were performed to identify the extent of rainfall during intense southwest monsoon rainfall episodes in the Philippines and compare it with satellite rainfall estimates and other merged rainfall products. The newly developed product captured the spatial distribution and intensity of heavy rainfall well for all cases studied but tended to slightly overestimate the intensity for extreme rainfall. With reference to other satellite rainfall estimates, the aforementioned rainfall data performs better in depicting the intensity of heavy rainfall events but tends to underestimate light rainfall. In the future, the newly developed gridded rainfall dataset with a 22-year temporal resolution (1998 - 2020) will be made digitally available for download and use by the general public.

Keywords: Southwest monsoon, merged satellite and station rainfall data, the Philippines