

# Validation of TRMM 3B42 Research Version Rainfall Product at Lai Nullah Basin in Islamabad, Pakistan

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## Abstract

In this study, the aptness of the research version Tropical Rainfall Measuring Mission (TRMM) Multi-satellite Precipitation Analysis (TMPA) 3-hourly product has been appraised at various time scales including its finest resolution i.e. 3-hour, at Lai Nullah basin in Islamabad, Pakistan. TMPA hourly rain rates are assessed by using most commonly used statistical measures such as correlation coefficients (CC), mean bias error (MBE), mean absolute error (MAE) and root mean square error (RMSE). The results show that the TMPA exhibits an overall underestimation. Seasonally, TMPA underestimates rainfall in monsoon and post-monsoon while overestimates in winter and pre-monsoon. A greater MBE and RMSE are found with TMPA rain measurements in monsoon and post-monsoon seasons. Overall, a weak correlation and high RMSE between TMPA and reference gauge hourly rain rates is found at 3-hourly (CC = 0.37, RMSE = 5.12) and daily (CC = 0.50, RMSE = 1.99) time scales. Correlation is significant at decadal (CC = 0.75) and monthly (CC = 0.9) time scales with tolerable error statistics. Within the parameters of the study, we conclude that TMPA is not a good choice at 3-hourly and daily time scales, however, can be used reliably at decadal and above decadal time scales for all seasons.

**Keywords:** TRMM, TMPA, 3-hourly Product, Rain Rate, Validation, Lai Nullah

Time Scale	TMPA Average (mm/h)	TRG Average (mm/h)	MBE (mm/h)	MAE (mm/h)	RMSE (mm/h)	CC
3-Hour Interval	1.79	2.53	-0.74	2.57	5.12	0.37
Mean Daily	1.21	1.39	-0.18	1.18	1.99	0.50
Mean Decadal	0.48	0.55	-0.07	0.25	0.45	0.75
Mean Monthly	0.39	0.45	-0.06	0.13	0.25	0.90

Table 1. Validation statistics at different time scales

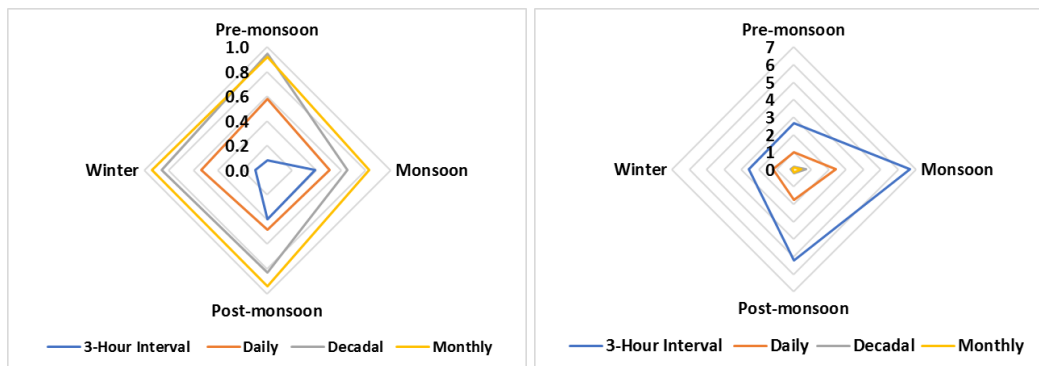


Figure 2. Seasons wise correlation coefficient (left), Seasons wise root mean square error (right)

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