

# Soil Moisture driven Machine Learning Approach to Correct Near Real Time Satellite based Rainfall Estimates: A case study in Hirakud Catchment in Mahanadi Basin, India

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Near Real-Time Satellite Rainfall Estimates (NRT-SREs) are feasible option for disaster monitoring. However, the NRT SREs have often been associated with complex and non-linear errors. In recent years, soil moisture-based error reduction approaches have gained favour as a means of improving SREs considering the fact that soil moisture is a feedback of rainfall on the earth surface. Thus, soil moisture driven machine learning approach was attempted in this study to improve an NRT SRE called Tropical Rainfall Measuring Mission (TRMM) Multisatellite Precipitation Analysis (TMPA) product 3B42RT Version 7 over a larger catchment located in the Mahanadi river basin. The performance of the 3B42RT and the corrected product were assessed using different statistical measures such as correlation coefficient, bias, and root mean square error. Overall, the results revealed significant improvement in the corrected product compared to 3B42RT across the catchment. Particularly, for light and moderate rainfall classes, the corrected product showed the highest improvement. On the other hand, the corrected product showed limited performance for the heavy rainfall class. These results demonstrate that the adopted approach has potential to enhance the quality of NRT-SRE through the use of near real-time satellite-based soil moisture estimates. However, the robustness of the approach needs to be tested rigorously in catchments located in different climatic conditions and using different rainfall products and soil moisture datasets.

Keywords: Hirakud Catchment; Machine Learning <https://www.mdpi.com/search?q=support%20vector%20machine-based%20regression%20%28SVR%29>; Near real time satellite rainfall estimates; Satellite based Soil Moisture; TMPA 3B42RT