Improved TMPA 3B42 estimates across Indian land region using static topographic and climate region information

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Several validation studies on various Satellite Rainfall Estimates (SREs) carried out around the world showed that the SREs underestimate the rainfall in orographic regions and overestimates the rainfall in arid regions. These results raise a significant question: Whether the inclusion of climatic information and static topographic information can improve the satellite rainfall estimates at regional scale? The present study, therefore aims to evaluate this scientific question using TMPA 3B42 estimates of southwest monsoon period across India during 2009-2015. Accordingly, in this study, various static topographic features such as elevation, slope, and aspect are extracted from the digital elevation model (DEM) for different climate regions of India and then a LASSO regression model is developed between gauge rainfall data and static topographic features and TMPA 3B42 estimates for each climate region to correct the TMPA 3B42 estimates. Thus obtained results show significant improvement in statistics like correlation coefficient, root mean square error, and bias in the Western Ghats and North-East India where the orographic rainfall is dominant. Whereas in other regions, bias has significantly reduced but trivial improvement in other statistics. These results indicate that the hypothesis is true and suggests the algorithm developers to incorporate the static topographic and climatic information in the algorithm.