

Performance evaluation of Google Earth Engine based precipitation datasets under different climatic zones over India

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Abstract

Satellite-based as well as reanalysis-based datasets are widely available and useful in detecting spatial and temporal variability of rainfall at a finer resolution. These products have been widely used in weather forecasting, hydrological and climate studies. However, the accuracy of these satellite products varies spatially and across different datasets. In this study, the accuracy of five satellite-based precipitation products with different spatial resolutions i.e., CHIRPS, ERA5, TRMM, GPM, and Terra Clim available on Google Earth Engine (GEE) were compared with India Meteorological Department (IMD) grided data in six climate zones in India. The statistics such as RMSE, R^2 , MSE, and PBIAS were computed. It was observed that the performance of each product varies in different climatic zones. The GPM was observed to have high accuracy in arid, semi-arid, and tropical wet zones. TRMM showed a good match in tropical wet & dry, tropical wet, and semi-arid zones. Terra Clim and ERA5 showed high accuracy in humid subtropical and montane regions respectively. It was also observed that CHIRPS was found to be least suitable in all the climate zones across India. The findings from the present studies will serve as a guiding document for the researcher to select appropriate datasets for different applications such as drought monitoring, precipitation anomaly, hydrological models, or other related studies in India.

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