

How well do different Observational Gridded Data Quantify Long-term Rainfall Change over North-Central India?

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Abstract—Observational gridded datasets are one of the key ingredients of climatic research for the assessment of climate change of a region as well as for the validation of GCM and RCM outputs of that region. We have to depend vastly on these datasets, as real observations are not available and inadequate in many cases. In this study, performance of different observational datasets e.g. IMD gridded data, CRU, APHRODITE, GPCC, NCAR/NCEP reanalysis data have been tested with respect to the available true observational data from Indian Institute of Tropical Meteorology (IITM) in different seasons (MAM, JJAS, ON and DJF) as well as in annual scale for the period 1951-2003 over North central India, a region of subtropical monsoon climate. It is found that all the datasets have simulated the observed annual cycle quite well. But APHRODITE and NCEP reanalysis have shown large wet bias in all seasons. IMD, APHRODITE and GPCC data are highly correlated with observed rainfall. The observed rainfall has shown 6.3 mm, 4.2 mm, 1.9 mm and 11.2 mm increase per decade for MAM, JJAS, DJF seasons and annual rainfall respectively whereas 2.2 mm decrease per decade for ON season. Only GPCC dataset have been able to capture similar trend for all seasons. Performance of NCEP reanalysis is worse in compared to others. GPCC high-resolution data has shown smallest bias among all the datasets and also obtain superior skill scores than others. Present study reveals that GPCC high-resolution gridded data may be used confidently for any climate change research or as a substitute data source to replace missing values in station records over this region.

Keywords: Observation gridded datasets, North Central India, Seasonal and annual rainfall, Linear trend, Correlation, Bias, Skill scores.