Extreme precipitation detection ability of four high-resolution precipitation products dataset in Nepal

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Due to Nepal's propensity for extreme precipitation (EP), it is essential to thoroughly research and comprehend the pattern that these occurrences have followed in previous years. However, precise precipitation information for EP research from densely-gauged networks is still difficult to obtain in mountainous countries like Nepal. This will consequently impede the dissemination of knowledge pertaining to the variability of extreme precipitation events in Nepal. The lacking factors in the current research trend could be attributed to the following points: (1) Very few to none studies that utilized the recently released high-resolution precipitation products in Nepal to identify their EP detection ability, (2) Most of the studies focused on the characterization of EP events in Nepal rather than its spatial and temporal variability. In order to address these issues, four high-resolution precipitation product datasets (PPDs) were evaluated for their extreme precipitation detection ability across Nepal from 1985 to 2020, namely, ERA5 Land reanalysis data, satellite-based precipitation data (PERSIANN_CCS_CDR), and merged datasets (CHIRPS_V2.0 and TPHiPr). The Mann-Kendall test trend, Sen's slope estimator, and various statistical and categorical indices were used to assess how well these PPDs performed. TPHiPr merged dataset represented monthly precipitation estimates better than other PPDs. In addition to having the highest CSI and the highest ACC, TPHiPr also has a high POD and a low FAR. As a result, it can be said that TPHiPr is the best PPD for determining whether there is 0.1 mm of precipitation per day across Nepal or not. Since it had fewer representational errors for the majority of the EP indices, TPHiPr was also rated as the best in terms of their temporal representation. TPHiPr dataset and the observed dataset showed stronger correlations for some EP indices, including frequency EP indices (R10mm, R20mm, and R25mm) and intensity EP indices (RX1 day, RX5 day, PRCPTOT, and R99p). Hence, it performed better than other PPDs in accurately capturing the spatial distribution of EP occurrences in Nepal for the period of 1985 to 2020 based on the aforementioned facts. This dataset can be used to improve existing knowledge in Nepalese hydrometeorology and climate research.