Title:	Monsoon precipitation characteristics and extreme precipitation events over Northwest India using Indian high resolution regional reanalysis
Authors:	Aggarwal, Deepanshu (/jspui/browse?type=author&value=Aggarwal%2C+Deepanshu) Attada, Raju (/jspui/browse?type=author&value=Attada%2C+Raju) Shukla, K.K. (/jspui/browse?type=author&value=Shukla%2C+K.K.)
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Abstract:	Northwest India, known as the breadbasket of the country, is extremely vulnerable to ramifications of extreme rainfall events (EREs) such as flash floods, landslides, agricultural and infrastructural damages. Nevertheless, the characteristics of EREs are less explored over Northwest India compared to other parts of the country. Hence, this study investigates the spatiotemporal variability of EREs using India's first highest resolution regional atmospheric reanalysis, Indian Monsoon Data Assimilation and Analysis (IMDAA) during Indian Summer Monsoon (ISM) for the period 1979–2018. Prior to understanding the EREs, we evaluated IMDAA's ability to represent general ISM characteristics using reanalysis and observations. Our analysis reveals that IMDAA realistically represents the ISM salient features along with a more accurate spatial distribution of summer precipitation compared to India Meteorological Department (IMD) observations, albeit with some overestimations. The mean ISM precipitation over Northwest India is found to be increasing significantly at 95% confidence level. Furthermore, EREs from IMD and TRMM exhibit increasing trends over Northwest India, which also conforms with IMDAA results (one event every two years). The rising (declining) trend in convective available potential energy (convective inhibition energy) signifies that the atmosphere over Northwest India is becoming more unstable during ISM. This enables it to hold more moisture, which is transported to the region from Bay of Bengal through cyclonic vorticity over Central India. Finally, the inter-parameter correlation analysis reveals that IMDAA reanalysis has succeeded in better representation of the physical linkages among moisture availability, instability, and convective precipitation formation over Northwest India compared to the global reanalysis products such as ERA5.
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