

Intraseasonal variability of summer monsoon rainfall and droughts over central India

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Abstract: Rainfall over Madhya Pradesh (MP) in central India has large intra-seasonal variability causing droughts and floods in many years. In this study, rainfall variability in daily and monthly scale over central India has been examined using observed data. Consistency among various datasets such as rainfall, surface temperature, soil moisture and evapotranspiration has been examined. These parameters are from various different sources and critical for drought monitoring and prediction. It is found that during weak phases of monsoon, central India receives deficit rainfall with weaker monsoon circulation. This phase is characterized by an anticyclonic circulation at 850 hPa centered on MP. The EOF analysis of daily rainfall suggests that the two leading modes explain about 23.624% of rainfall variability in intraseasonal timescale. These two modes represent drought/flood conditions over MP. Relationship of weak phases of rainfall over central India with real-time multivariate (RMM) indices of Madden Julian Oscillation (MJO) has been examined. It is found that RMM-6, RMM-7, RMM-1 and RMM-2 describe the weak monsoon conditions over central India. However, frequency of drought occurrence over MP is more during RMM-7 phase. Surface temperature increases by about 0.561 during weak phases of rainfall over this region. Soil moisture and evapotranspiration gradually reduce when rainfall reduces over the study region. Soil moisture and evapotranspiration anomalies have positive pattern during good rainfall events over central India and gradually reduce and become negative anomalies during weak phases.