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Title:	Understanding the Monsoonal extreme rainfall events in central india: Dynamics, thermodynamics, and long-term climate drivers
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Abstract:	<p>Understanding and predicting the behavior of precipitation extremes in the tropics have often been associated with uncertainty. One such location in the tropics with an even greater uncertainty is the Central Indian region with additional influences from the Indian Summer Monsoon. In this thesis, we highlight some of such exceptional activities associated with the precipitation anomalies that add further expanse into the uncertainty and explore possible factors explaining those. Past literature have established that the annual count of the monsoonal extreme precipitation events in Central India has been on a long-term inclining trend. But, deviating from those, we have observed with robustness that the temporal frequency patterns of rainfall extremes have been declining in the recent decades since 2005. Through systematic analysis of the local, regional, and long-scale moisture dynamics and thermodynamics, we explain this exceptional trend by associating it with the Atlantic Zonal Mode, the presence of anomalous subsidence in the regional Hadley circulation cell, weakening of the moisture transporting low-level Somali jet and the reduction in trends of evaporation from the entire Indian Ocean basin. Additionally, the moist thermodynamics of Central India also agrees well with the dynamics by indicating that the atmospheric column since 2005 has become less susceptible to initiating convection. Furthermore, we have identified the next exceptional phenomenon in the consecutively switching correlation patterns between the Atlantic Zonal Mode and the frequency of central Indian extreme rainfall events at different time periods with the negative correlation period having been observed to possess a co-directional relationship with all three major tropical climate drivers. The teleconnection mechanism during this negative period of correlation is explained by the presence of anomalous Walker circulation illustrated through the strengthened tropical easterly jet. In addition, the long-term relationships between various basic thermodynamic parameters during the monsoonal precipitation and extremes are analyzed in brief, appurtenantly.</p>
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