Change in Potential Predictability of Indian Summer Monsoon Dry and Wet Spells in Recent Decades

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An understanding of the limit on potential predictability is crucial for developing appropriate tools for extended range prediction of active/break spells of Indian summer monsoon (ISM). The global low frequency changes in climate modulate the annual cycle of the ISM and can influence the intrinsic predictability limit of the ISM intraseasonal oscillations (ISOs). Using 104 year (1901-2004) long daily rainfall data, the change in potential predictability of active and break spells are estimated by an empirical method. It is found that the potential predictability of both active and break spells have undergone a rapid increase during the recent three decades. The potential predictability of active spells has shown an increase from one week to two weeks while that for break spells increased from two weeks to three weeks. This result is interesting and intriguing in the backdrop of recent finding that the potential predictability of monsoon weather has decreased substantially over the same period compared to earlier decades due to increased potential instability of the atmosphere. The possible role of internal dynamics and external forcing in producing this change has been explored. The changes in energy exchange between the synoptic and ISO scale and the different ISO modes as evidenced by energetics computations in frequency domain also support the increased potential predictability of ISO. Our finding provides optimism for improved and useful extended range prediction of monsoon active and break spells.

Keywords: Intraseasonal oscillations; potential predictability.



Figure 1. Change in potential predictability of rainfall ISO through a 15 year sliding window. a) for evolution from active to break b) for evolution from break to active

References

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