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Title: Indian summer monsoon rainfall potential predictability on sub-seasonal to seasonal time scales

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Abstract:

Mechanisms for predictability of summer monsoon rainfall over India on sub-seasonal to seasonal time scales include the intraseasonal oscillation (ISO) and the El Nino-Southern Oscillation (ENSO). However, the extent to which these large-scale phenomena translate into predictability of rainfall at local-to-regional scales is still poorly known.

We use a multi-channel singular spectrum analysis (M-SSA) of OLR and reanalysis winds in order to define an interannually-modulated annual cycle and ISO components. These are then used to drive a non-homogeneous hidden Markov model (N-HMM) fitted to 0.25-degree gridded daily observations of Indian rainfall. When the ISO and modulated annual cycle are specified as "perfect" inputs, monthly rainfall variability is found to be skillfully reproduced during June-July and September in many regions, but only very poorly reproduced during August. These results demonstrate an important seasonality in S2S rainfall potential predictability over monsoonal India which we further quantify using spatial aggregates of the 0.25-degree rainfall grid.

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