

SESSION: (C3) Time scale interaction (includes teleconnections)

(C3-07)

Impact of intraseasonal oscillations on onset and demise of the Indian summer monsoon rainfall.

Karmakar, Nirupam (1), Misra, Vasubandhu (1,2,3)

Florida State University (1), Florida Climate Institute (2), Center for Ocean- Atmospheric Prediction Studies, Tallahassee (3)

Two of the most important hydroclimatic features of the Indian summer monsoon rainfall (ISMR) are its onset/demise and intraseasonal variability manifested by the active-break cycles. In this study, we aim to understand the quantitative association between these two phenomena. An objective definition of local onset and demise of ISMR based on more than a century long India Meteorological Department (IMD) rain-gauge observation is taken into consideration in this study. Onset and demise are defined over the native grids (0.25 deg x 0.25 deg) of the IMD data. This definition of onset and demise avoids false onset and advantageous as it has a close correspondence with the seasonal rainfall anomaly.

Using a non-parametric spectral approach, we identify intraseasonal oscillatory (ISO) modes in rainfall over India and extracted two classes of variability: low- and high-frequency ISO (LF-ISO and HF-ISO). They exhibit periodicities of 25–60-days and 10–20-days, respectively. Rainfall over India is highly modulated by these two modes and active spell with copious rainfall at a location is marked by concurrent peaks of these two oscillations. LF-ISO is characterized by northward march of rainfall bands from the southern-most part of India to the foothills of the Himalayas. HF-ISO shows comparatively more complex and small-scale structures, with a north- westward propagation along central India.

Using the definition of local onset and demise and LF-ISO and HF-ISO characterized at each location, we aim to understand the association between them. In other words, how ISO modes modulate the onset and demise at each location. We calculate the phases of the ISO modes based on its periodic nature and determined the phases of ISO during onset and demise occurred at each grid point. It is observed that the probability of occurrence of local onset is remarkably high when LF- and HF-ISO exhibit favorable conditions over that location. Onset dates are mostly marked by the ascending limb of the positive part of the ISO cycle, with LF-ISO showing stronger modulation. Similar results are seen for local demise, which is mostly seen over the descending limb. The results presented here establish an important aspect of the predictability of monsoon onset and demise. Association between the two phenomena raises the hope for the predictability of local onset and demise, as they could be related to slowly evolving large-scale circulation. This could be an important avenue in the problem of forecasting onset/demise using numerical simulations.