

Temporal and spatial signatures of ENSO on the Indian summer monsoon from 1901-2009

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Abstract. Correlations of daily gridded rainfall with Pacific sea-surface temperatures (SSTs) reveal that the teleconnection between El Niño Southern Oscillation (ENSO) and Indian summer monsoon rainfall is spatially distinct by region, with rainfall in western India more highly correlated to Pacific SSTs than in eastern India. This spatial signature shifts as the monsoon progresses through early (June), middle or peak (July-August) and late (September) sub-seasons. Furthermore, the spatial signatures between La Niña and El Niño are asymmetric in that for a particular location, the enhancement and suppression of rainfall associated with La Niña and El Niño conditions, respectively, are not equal. Despite a weakening in the ENSO-All-India monsoon rainfall (AISMR) relationship during recent years, certain regions of India have maintained their ENSO relationship. Moreover, these same regions are largely agricultural and would thereby benefit from better forecasting. These findings indicate that focusing monsoon forecasting efforts on these regions and on sub-seasonal periods while incorporating ENSO asymmetries will yield useful and skillful forecasts, compared to the declining utility and skill of AISMR