



Different impacts of mega-ENSO and conventional ENSO on the Indian summer rainfall: developing phase

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Mega-El Niño-Southern Oscillation (ENSO), a boarder version of conventional ENSO, is found to be a main driving force of Northern Hemisphere summer monsoon rainfall including the Indian summer rainfall (ISR). The simultaneous impacts of “pure” mega-ENSO and “pure” conventional ENSO events on the ISR in its developing summer remains unclear. This study examines the different linkages between mega-ENSO-ISR and conventional ENSO-ISR. During the developing summer of mega-El Niño, negative rainfall anomalies are seen over the north-eastern Indian subcontinent, while the anomalous rainfall pattern is almost the opposite for mega-La Niña; as for the conventional ENSO, the approximate “linear opposite” phenomenon vanishes. Furthermore, the global zonal wave trains anomalous are found at mid-latitude zones, with a local triple circulation pattern over the central-east Eurasia during mega-ENSO events, which might be an explanation of corresponding rainfall response over the Indian Peninsula. Among 106-year historical run (1900 [U+F02D] 2005) of 9 state-of-the-art models from the Coupled Model Inter-comparison Project Phase 5 (CMIP5), HadGEM2-ES performs a promising skill in simulating the anomalous circulation pattern over mid-latitude and central-east Eurasia while CanESM2 cannot. Probably, it is the models’ ability of capturing the mega-ENSO-ISR linkage and the characteristic of mega-ENSO that make the difference.