Hydroclimatic Impact of the ENSO on South Korean Precipitation Patterns

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Abstract. Deciphering the mechanisms through which the El Niño/Southern Oscillation (ENSO) affects hydrometeorological parameters in the tropics and extratropics is of great interest. We investigate climatic teleconnections between El Niño/La Niña and precipitation patterns over South Korea using an empirical methodology designed to detect regions showing a strong and consistent hydroclimatic signal associated with ENSO. We calculate not only spatial coherence values by monthly precipitation composite formed over 2-year ENSO cycle and the first harmonic fit to detect candidate regions, but also temporal consistency rates by aggregate composite and index time series to determine core regions. As a result the core regions, namely the Upper Region (UR), the Middle Region (MR), and the Lower Region (LR), are identified with a high level of response of ENSO forcing to precipitation patterns. For all core regions, the ENSO composites indicate drier (wetter) conditions in early fall of the El Niño (La Niña) years and wetter (drier) conditions from winter through spring of the following year. The spatial coherence rates of core regions for El Niño (La Niña) are over 94% (96%) and the temporal consistency rates are over 80% (78%). According to the comparative analyses for the core regions identified by composite and harmonic analysis during both extreme episodes, the El Niño and La Niña-precipitation relationships show reverse patterns of sign, positive and negative precipitation anomalies. Based on the results of annual cycle analysis, Mann-Whitney U test, and cross-correlation analysis, the wet anomalies during the warm event years are more significant than the dry departures during the cold event years. In conclusion, South Korea experiences climatic teleconnection between the tropical ENSO forcing and mid-latitude precipitation patterns.

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