Teleconnections between the ENSO and Precipitation Patterns over South Korea

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Abstract. Climatic links between monthly precipitation in South Korea and the El Nino and La Nina events using the empirical methodology of composite and harmonic analyses for each event during a 24-month evolution period. Coherent and significant precipitation responses to both the extreme phases of the southern oscillation (SO) are found in three core regions, namely the upper region (UR), middle region (MR), and lower region (LR). The geographical extent of the three regions, together with a defined signal season for each tropical event, is identified. The areal extent of all regions with a defined seasonal signal for the case of each tropical event was determined. For UR, the Feb(+)–May(+) wet period during El Niño events is the season when the teleconnection is strong and consistent. For MR and LR, the Nov(0)–Apr(+) and Nov(0)–May(+) wet period during El Niño events are found to be the signal season having high rates of coherence and consistency. On the other hand, the occurrence of the signal season (the dry period of Oct(0)–Jan(+) in UR and Nov(0)–May(+) in MR) during La Niña events appears to be significant in UR and MR according to the harmonic analysis. Moreover, the annual cycle analysis implies somewhat of a modulation of regional precipitation in the UR, MR, and LR regions during the relevant signal season. From other perspectives, correlation results of monthly precipitation and monthly SOI values confirm the implied teleconnections, and the correlation coefficients with respect to time lags corresponding to the El Niño and La Niña occurrences supply some indications. The analysis shows that the spatial coherence rates of UR, MR, and LR for El Niño events are 0.94, 0.98, 0.98, while those for La Niña events are 0.98, 0.98, 0.95 respectively. On the other hand, the temporal consistency rates of UR, MR, and LR for the warm episodes are 0.80, 0.90, 0.80, while those of UR, MR for the cold episodes are both 0.78. In each of the regions, the El Niño/La Niña-precipitation relationships show the opposite sign, positive and negative precipitation anomalies respectively. Also the wet anomalies during the warm event years, which prevail over the whole region, are more consistent than the dry anomalies in cold event years, based on the results that there are 3 core regions associated with El Niño episodes, while 2 core regions responded to La Niña episodes. In conclusion, mid-latitude precipitation responses to the extreme phases of the large-scale climatic pattern are detectable over South Korea.

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