



Possible impact of the diabatic heating over the Indian subcontinent on heat waves in South Korea

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We investigate the impact of the diabatic heating (Q_1) over the Indian subcontinent and Tibetan Plateau (TP) sensible heat on the heat waves in South Korea in July and August over a recent 42-year period. In particular, we emphasize the role of the convective activity across the region from northeastern Pakistan to northwestern India (PWI) induced by the heat from the TP, especially over the western and eastern TP. A composite analysis indicates that the composite differences between the heat-wave summers (HWS) and non-heat-wave summers (NHWS) resemble the circum-global teleconnection (CGT) pattern, which generates a high-pressure anomaly over the Korean Peninsula, producing favourable conditions for heat waves in South Korea. The first coupled mode of the geopotential height at 250 hPa with the daily maximum temperature (TM) for July and August in South Korea is consistent with the composite pattern, suggesting that the diabatic heating over the Indian subcontinent induces a high-pressure anomaly over the Korean Peninsula through a CGT-like mechanism. The regression analysis of the wind vectors in the upper troposphere also indicates that the diabatic heating over the PWI region and associated TP sensible heating generates the strong convection over the PWI region, which corresponds to the anomalous anticyclonic circulation at 250 hPa over the western TP and the cyclonic circulation at 850 hPa over the PWI region. Moreover, the correlation patterns of the 250-hPa geopotential height with the normalized rainfall amount index (IMRI) over the PWI region and the wave activity flux pattern confirm that the strong convective activity over the PWI region contributes to the anomalous high pressure and heat waves over the Korean Peninsula.