

Role of the South Asian High in Connecting the Summer Rainfall over Asian Monsoon Regions and the Mid-latitude Arid Region

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The South Asian high (SAH) is the most intense and persistent upper-level anticyclone during boreal summer. Diagnostic analyses reveals that the southeast-northwest (SE-NW) movement is a dominant feature of the SAH on the interannual timescale, and it is closely related to the Indian and East Asian summer monsoon rainfall, and an out-of-phase rainfall variation over central Asia (CA) and North China (NC) in the mid-latitudes. An anomalous AGCM is utilized to examine the effect of latent heat anomalies associated with the Asian summer monsoon rainfall on the SAH. The negative latent heat anomalies over the northern Indian Peninsular associated with a weak Indian summer monsoon stimulates an anomalous cyclone to its northwest and an anticyclone to its northeast over the eastern Tibetan Plateau and eastern China in the upper troposphere, which is responsible for the east-west shift of the SAH and more rainfall in the Yangtze River Valley (YRV). The positive latent heating release associated with rainfall anomalies in the YRV excites a southward located anticyclone over eastern China, exerting a feedback effect on the SAH and leading to a SE-NW shift of the SAH. And the southeastward shift of SAH is responsible for a southeastward shift of the AWJS. The anomalous atmospheric circulation associated with the southeastward located SAH produces anomalous updrafts (downdrafts) over the western (eastern) AWJS region, resulting in increased rainfall over CA and decreased rainfall over NC. It is proposed that the SAH may play an important role in connecting the rainfall over the Indian and East Asian monsoon regions, and also the rainfall over the mid-latitudes.