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Quasi-biweekly impact of the atmospheric heat source over the Tibetan Plateau on summer rainfall in eastern China

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We investigated the intraseasonal relationship between the atmospheric heat source over Tibetan Plateau (TP) and summer rainfall in eastern China. A quasi-biweekly oscillation (QBWO) is the common dominant periodicity over both the TP and eastern China. Crucially, the TP heat source QBWO leads rainfall QBWO over its downstream region by 2–8 days. The QBWO over the TP shows a significant eastward propagation. Phase composite further identified the specific propagation pathway: TP QBWO first propagates eastward to central China, southward to southern China, and then northeastward to the lower reaches of the Yangtze River with a zigzag propagating pathway. Mechanistically, the eastward propagation of the upper level divergence caused by the movement of the 200 hPa jet core and south Asian high contributes to the eastward propagation of the rainfall QBWO. Simultaneously, the eastward (westward) shift in the western north Pacific subtropical high causes deepening (flattening) of the monsoon trough and the occurrence of an anomalous cyclone (anticyclone) over the western north Pacific. An anomalous anticyclonic (cyclonic) circulation around the TP appears with the wet-to-dry (dry-to-wet) phase transition of the TP QBWO. Together, they play a crucial part in the southward (northeastward) movement of the QBWO. Further dynamic analysis indicates that the horizontal moisture advection acts on the whole eastward-propagating process of the QBWO, whereas the horizontal vorticity advection is only significant when QBWO is over the TP. This study shows that the fluctuations in TP heat source are important indicators in extended forecasts of summer rainfall in eastern China.