

The analysis and numerical simulation of the impact of Water Vapor over Tibet Plateau on Summer Precipitation in the Middle and Lower Reach of the Yangtze River

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Qinghai-Tibet Plateau has an important influence on the precipitation of its lower reaches.

Based on JICA Tibetan sounding data in 2008, ERA-Interim and MERRA reanalysis data during 1979-2015 and monthly average precipitation of 160 stations in China, the influencing of Water Vapor over Tibet Plateau (TP) on Summer Precipitation in the Middle and Lower Reach of the Yangtze River (MLRYR) were analyzed at first.

firstly we assessed the applicability of two reanalysis data on Tibetan Plateau; secondly we defined the high-level and low-level difference of water vapor flux divergence on TP as TP water vapor pumping index; by synthetic analysis, we found there were mainly five water vapor paths influencing summer precipitation in middle and lower reach of Yangtze River. Five paths were closely related. The significant positive correlation between water vapor of five paths and Summer Precipitation in MLRYR were found.

We defined the water vapor pumping index. The water vapor pumping indexes over TP between drought and flood year of MLRYR were compared to explain the possible influence Mechanism. We found that TP water vapor pumping could pump up water vapor in lower level to the top of TP, and played an indirect role in influencing the summer rainfall in Yangtze River by increasing zonal water vapor transport towards the Yangtze River Basin.

Numerical simulations were carried by assimilation conventional data [U+FF0C] sounding data and satellite data over TP. We found that assimilating satellite and terrestrial and sounding data made the forecast on precipitation intensity, area and the center of the precipitation in the Middle and Lower Reach of the Yangtze River more accurate through improving the initial humidity fields of model.

Key words: Tibetan Plateau; water vapor pumping; water vapor path; middle and lower reach of Yangtze River; summer precipitation; numerical simulation