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The diagnostic study of water vapor transport during A strong extreme precipitation event at Yili river valley

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A strong extreme precipitation events was happened during 31 July to 1 August, 2016 at Yili river valley which multi-stations breakthrough precipitation's extreme value. Based on rainfall and atmospheric circulation situation analysis and decomposing the vertically integrated water vapor transport vector into the sum of its nondivergent (rotational) and divergent (irrotational) components in terms of the stream function and potential using the conventional detection,1 ˚ x 1 ˚ NCEP/NCAR reanalysis and Ground-based GPS observation precipitable water vapor data(GPS-PWV) , the large-scale water vapor transport and convergence characteristics were analyzed during the heavy rainfall period, The results showed that: (1) the 500 hPa trough moving slowly was responsible for the heavy rainstorm at the Yili river valley ; High and low air jet stream were coupled, and the upward movement was enhanced which was favor of dynamic lifting condition to heavy rainfall happened; (2) the Indian ocean, the Pacific ocean and the Atlantic ocean were all contributed to the water supply during the heavy rain period, and Indian summer monsoon circulation, the south China sea summer monsoon circulation at low latitudes and Atlantic ocean east airflow at mid-latitude, were constituted the water vapor transmission channel of the heavy rain, which the water vapor transport in the Indian ocean was mainly concentrated in the lower troposphere, middle troposphere water vapor transport was given priority to the east flow of the Atlantic ocean and water vapor transport carried by low trough, the water vapor transport were mainly concentrated in the lower troposphere; Yili river valley was controlled in the water collection area;(3) Yili valley's GPS jumped was caused by the southwest airflow front of low trough before the rainfall happened, and GPS steadily maintain the high value influenced by India southwest monsoon during the heavy rainfall period, the large-scale water vapor transport convergence enhancement corresponding local GPS-PWV increased, suggested that the Yili river valley water supply in local heavy rain event was at least associated with the water vapor transport and convergence of hemisphere scale.