



The Influence of Low-frequency Oscillation Propagation of the Tibetan Plateau Vortex on Rainstorm Downstream

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Based on Tibetan Plateau vortex data, ERA-Interim and NCEP/NCAR reanalysis data, the characteristics of Tibetan Plateau vortex and the relationship with Low-Frequency Oscillation (LFO) from 2003 to 2012 were investigated. The heavy rainstorm occurred in Sichuan from June 29th to July 2nd in 2013, caused by the LFO, was studied. Besides, the signal of LFO, energy transmission and those influence to rainstorm were also investigate. The main conclusions are as follows:

(1) Most of Tibetan Plateau vortex generate in eastern plateau, located at Tanggula Mountains, Zado, Dege, Qumalai and Qaidam. The moving-out Tibetan Plateau vortex mainly generate in Qumalai and most vortex occurrences during April to September. There are three directions of moving-out vortex paths: northeast, southeast and east. The areas which plateau vortex moving into are mainly distributed in Gansu, Sichuan, Shaanxi and Ningxia.

(2) The zonal wind at 500hPa in plateau key region has a significant main 10-30d oscillation, with the secondly significant oscillation in 30-50d and the third in 70-90d. The relative vorticity at 500hPa in plateau key region has a significant main 30-50d oscillations, with the secondly significant oscillation in 10-30d. The 30-50d oscillation phase zone with weak westerly oscillation zone of 500hPa, and the 10-30d oscillation positive phase zone with weak oscillation zone of 500hPa are benefit to vortex generation. The 30-50d oscillation of zonal wind at 500hPa provides necessary circulation background for generation of plateau vortex, and positive phase region of 10-30d oscillation of relative vorticity at 500hPa provide necessary dynamic background conditions for it.

(3) Comparing with the high frequency oscillation vortex, 10-25d low-frequency vortex is not significant at 500hPa before merging into the basin vortex. However, after merging into the basin vortex, there is a significant relationship between low-frequency vortex and the process of development, weakening and disappearance during the basin rainstorm. A typical heavy rainstorm occurred in Sichuan was studied. In the horizontal direction $[U+FFOC]$ atmospheric disturbance energy transmit from the west Sichuan plateau to heavy rainfall areas in basin, that is indicating the low-frequency atmospheric disturbance energy transmission. In the vertical direction, the disturbance energy transfer to the downstream is probably the major reason caused this heavy rainstorm. The value of wave packet and disturbance energy indicates the difference stages of rainstorm.

Key words: the tibetan plateau; plateau vortex; FLO; rainstorm; wave-packet

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