THE ENVIRONMENTAL FIELDS ANALYSIS OF DEPARTURE TIBETAN PLATEAU VORTEX

39 **ACCOMPANYING WITH INDUCED SOUTH-WEST LOW VORTEX**

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1. INTRODUCTION

The Tibetan Plateau vortex (TPV) and the South-west vortex (SWV) of China is generated by the unique dynamic and thermal effect in the background of the complex Tibetan Plateau topography. The Tibetan Plateau vortexis mainly generated in the Plateau area and mainly active on 500hPa. The horizontal scale of the TPV is about 500km, vertical scale is 2-3km (Yeh and Gao, 1979). The SWV is generated in south-east of the Tibetan Plateau, South-west of China, is mainly active on 700hPa. The horizontal scale of the SWV is about 300-500km and mainly active on 700hPa (Lu, 1986).

The TPV is mainly generated in west of the Plateau and varnished in east of the Plateau, but few TPVs will move out of the Plateau and make storm rain or heavy storm rain in most area of China, cause meteorological disasters (Tao.S.Y and Ding.Y.H., 1981; Yu Shuhua and Gao Wenliang,1024). The SWV mostly generated and varnished in the same area, few of them will move out and lead to precipitation to China (Kuo and Chen, 1988).

The research in TPV and SWV influence is always the big issue in many meteorological scientists mind (Wang, 1987; Chang, 2000; Wang Z, 2003). This article will analyze the observational data, analyze the typical cases. to get the of the departure Plateau vortex accompanying with Induced South-west low vortex environmental fields characters.

2. DATA AND METHOD

The NCEP (National Centers for Envirmental Prediction) FNL reanalysis data of year 1998 to 2013, four times daily and with 1X1 degree of spatial resolution data is used.

The historical weather graphs provided by China Meteorological Administration and Qinghai-Xizang Plateau and shear line year books provided by institute of Plateau meteorology are also used in this paper.

By using synoptic and diagnosis methods we had inspected all the TPV processes in each month of May to September from year 1998 to 2013, and the sutained departure Tibetan Plateau vortex (SDTPV) is the TPVs generated in Plateau and departure the Plateau and be active more than 2 days out of the Plateau on 500hPa. The SWV is divided into Jiulong vortex, Sichuan basin vortex and Xiaojin vortex by their generation positions.

3. OBSERVATIONS

There are 25 processes of SDTPV and SWV from 1998 to 2013, 64% of them has the same moving directions, which number is 16. Most of the same directions SWVs is generated the by the SDTPVs, which number is 11, generated under the SDTPV's air flow.

4. THE ENVIRONMENTAL FIELDS OF SDTPV

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ACCOMPANYING WITH INDECED SWV

The environmental fields analysis of SDTPVs accompanying with induced SWV cases is selected by the longest living time of the different SWV three regions caused by TPVs. The C0726 Plateau vortex (Li Yueqing and Yu Shuhua, 2010) causing Sichuan basin SWV and the C0536 Plateau vortex (Li Yueqing and Yu Shuhua, 2012) causing Sichuan basin SWV are analyzed.

The SDTPV tracks of C0726 Plateau vortex and C0536 Plateau vortex is compared under the FNL data and historical graphs, two of them is consistent (Figure 1 a, b).

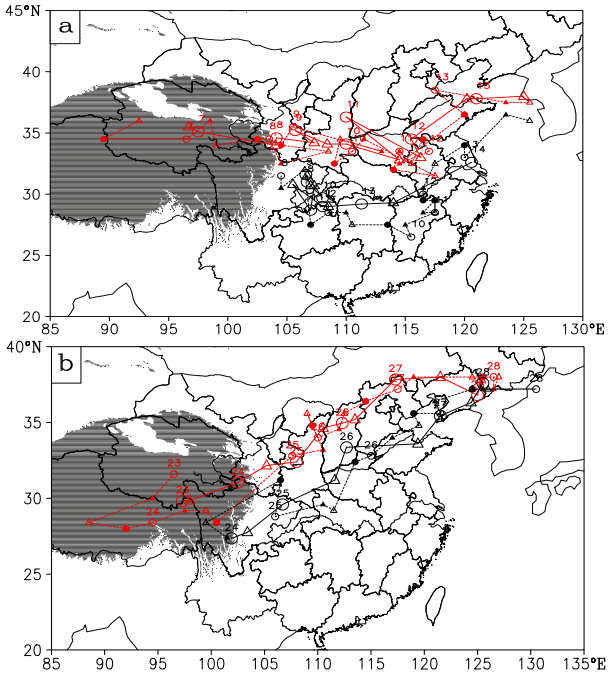

Figure 1 The moving tracks of the SDTPV and SWV represented by weather graph and NCEP FNL data (Shadowed area is the altitude more than 3000m region. The big red closed circle, big red open circle , big red closed triangle and big red open triangle represent 02, 08, 14 and 20 LST position of the SDTPV respectively in weather graph and connected with solid line. The small red closed circle, small red open circle , small red closed triangle and small red open triangle represent 02, 08, 14 and 20 LST position of the SWV respectively in weather graph and connected with solid line. The same for SDTPV and SWV by NCEP data, but connected with dashed lines. The number is the 08 LST of the SDTPV or SWV.)

a. C0726 SDTPV and accompanying Sichuan Basin vortexe.

b. C0536 SDTPV and accompanying Jiulong vortex.

The temperature, geopotential height fields of the two processes in generation, strong phase, departure the Plateau on 500hPa, 700hPa is analyzed carefully. The stream line field of the two cases is analyzed too. Futhermore, the voticity, vertical moving fields of the two processes is studied (Figure 2 a, b, c).

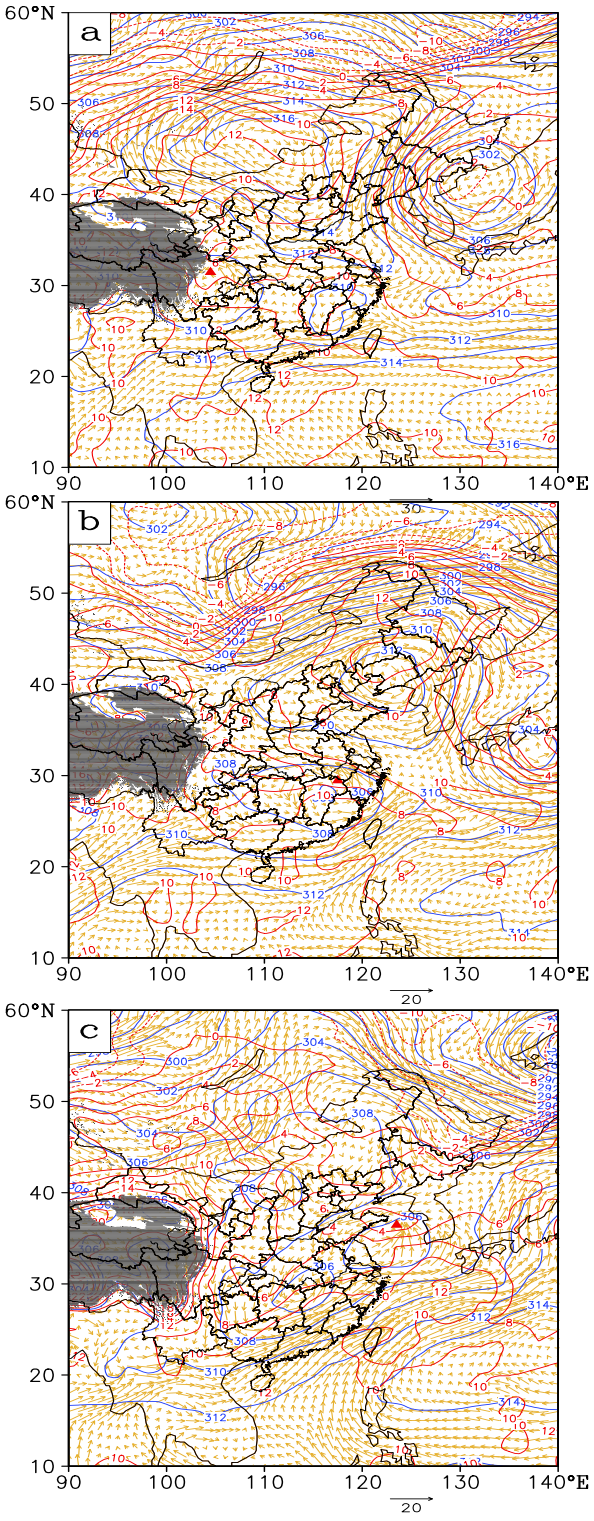

Figure 2 The geopotential height(unit: dagpm) , temperature (unit: °c) and wind field (unit:m/s) of the Sichuan Basin vortexe on 700hPa accomanying with the C0726 SDPTV.

a. The generation time of the Sichuan Basin vortex, 0800 LST 08, June, 2007.

b. The strong phase of the Sichuan Basin vortex, 0200 LST 11, June, 2007.

c. Moving out of the sea time of the Sichuan Basin vortex, 1400 LST 13, June, 2007.

5. SUMMUARY

(1) The SDTPV induced the SWV is a different type from the coupled TPV and SWV joint actions. In the joint active processes of SDTPV and SWV, the same moving direction of SDTPV and induced SWV is mainly happened and their main moving direction is to east or north-east.

(2) The SWV induced by SDTPV generated under the South-west air flow in the southeastern portion of the SDTPV Circulation, on 500hPa weaker along longitude in east Asia air flow, cold air influence the SDTPV. This means the SDTPV and SWV is consistent with each other. The SWV accompanying with the SDTPV will be stronger when the SDTPV stronger and be influenced a lot by the SDTPV status, its environmental fields change consistently with the SDTPV conditions.

(3) The SWV accompanying with the SDTPV generated in shear air region of South-west air flow of Bengal gulf and its north high pressure on 700hPa, it will be stronger with the influencing weather systems on 700hPa.

(4) The positive vorticity area in the southeastern portion of the SDTPV Circulation, stronger ascending air flow are the advantageous conditions for the SDTPV and will induce to the generation of the SWV. This is also the important condition of the two vortexes to move together. The strong ascending air flow and large area of positive vorticity region on 700hPa are the important condition for the SWV to be strong and sustaining.

(5) The environmental field differences of the Sichuan basin SWV and Jiulong are that the longitude scale of Jiulong SWV is weaker than the Sichuan basion SWV. The weather systems of the two vortex generation, moving out of the sea is different on 500hPa, which is same on 700hPa too. The positive vorticity region of Jiulong SWV is strong than the Sichuan basin SWV on 500hPa and 700hPa.

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