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论文

2009年深冬辽宁雨转暴雪和大雪过程对比分析

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Comparison between rain to blizzard process and heavy snow process during late winter 2009 in Liaoning province

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- 摘要
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摘要 针对辽宁2009年2月中旬旬初雨转暴雪过程和旬末大雪过程，利用常规观测资料和NCEP 10×10 逐6 h分析资料，从环流形势、影响系统、水汽和动力条件及热力结构等方面入手，对这两次过程进行对比分析。结果表明：这两次过程在许多方面显著不同。两次过程均发生在乌山阻高稳定的形势下，均受中纬度东移的中尺度低值系统影响，但雨转暴雪过程中高纬度为两脊一槽型，中纬度短槽与南支低槽结合携强冷空气东移，与低空急流在辽宁上空交汇。大雪过程为东低西高型，中纬度气旋性波动东移，切变线北抬过程中与西南暖湿气流作用影响辽宁。两次过程均发生在600 hPa以下相对湿度为80%以上的大气中，均具有低层辐合高层辐散的特征和深厚的上升运动，但雨转暴雪过程水汽含量更高，辐合层更深厚、强度更强，垂直速度较大雪过程大一个量级；两次过程都有明显的风垂直切变特征，但雨转暴雪过程发生在风垂直切变迅速增大的条件下，大雪过程风垂直切变相对稳定；雨转暴雪过程降水随湿位涡的发展而增强，两者有较好的对应关系，而大雪过程湿位涡表现微弱；雨转暴雪过程槽前0 ℃层达到850 hPa，槽后各层温度迅速下降至0 ℃以下，而大雪过程整层温度始终在0 ℃以下。

关键词： 雨转暴雪过程 大雪过程 环流形势 低空急流 风垂直切变 湿位涡 对比分析

Abstract： Based on the conventional observation data and reanalysis data (horizontal resolution 1° × 1°) from NCEP, two snow processes (rain to blizzard and heavy snow) in the middle ten days of February 2009 were analyzed. Circulation pattern, influencing system, water vapor and dynamic conditions together with thermal structure of two processes were compared. The results show that two processes are different in many aspects. Both occur under stable Ural blocking high and are influenced by eastward mesoscale low pressure system in middle latitude. However, weather situation of rain to blizzard process is two ridges and one trough in middle and high latitude. The short wave trough combines with the south low trough and moves eastward with cold air together, and they converge with low level jet over Liaoning province. Weather situation of the heavy snow is low in the east and high in the west, and cyclone fluctuates eastward in middle latitude. Shear line moves northward and influences Liaoning regions together with warm and moist air current from the southwest. Two processes happen in where air pressure is below 600 hPa and relative humidity above 80%, and both are of low level convergence and high level divergence as well as deep ascending motion. Compared with the heavy snow process, the rain to blizzard process is of high water vapor contents and deep and strong convergence as well as large vertical speed. There is the obvious wind shear in two processes. The rain to blizzard happens when vertical wind shear increases rapidly. However, wind shear is stable in the heavy snow process. For the rain to blizzard process, precipitation strengths with the development of moist potential vorticity, and there is a good corresponding relationship between them. However, for the heavy snow process, moist

potential vorticity is weak. Air pressure on 0 ℃ layer reaches 850 hPa in front of trough, and temperature in each layer descends rapidly and below 0 ℃ behind trough in the rain to blizzard process, while temperature of the total layer always is below 0 ℃ in the heavy snow process.

Keywords：

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