Characteristics of Convective Echoes around the Meiyu Front over Huaihe Basin
- Analyses with Hefei Dopplar Radar for 2001-2003 -

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1. Introduction

In order to understand the feature of precipitation around the Meiyu front, a series of heavy rain experiment have been carried out over east China continent recently; Over HuaiHe River Basin in 1998 and 1999, and in the downstream of Yangtze River for 2001-2003, there are few analyses about the annual variation of convective system, although many feature of precipitation system have been obtained from these experiments. Thus we try to examine the characteristics of annual variation of convective echoes over HauiHe Basin using Doppler radar data from 2001 to 2003 during the experiment in the downstream of Yangtze River by FORSGC.

2. Data and methodology

The analysis is conducted by using 3 years HeFei radar data, which consisting of 14 elevation steps from 0.3 to 19.7. Volume scan interval is about 5 to 6 minutes; Reflectivity interpolated into Cartesian coordinated with 1 km grid spacing in horizontal and vertical direction. An algorithm developed by Steiner et al. (1995) was used to classify the convection area in this paper. Regional Objective Analysis dataset (0.25°×0.25 °RANAL) provide by JMA is used

3. Result

Mean vertical profile of radar reflectivity in convective area for three years are shown in Fig.1. The profile indicates that (1) the core of reflectivity located at 3 km ASL with the same reflectivity for three yeas. □2□Above the 3 km, the reflectivity of 2003 is the strongest while that of 2001 is the weakest. Variation of daily averaged echo area (> 15dBZ and > 35dBZ) and daily averaged CAPE (at 02 ,08 14 20 BST by RANAL) for convective area are shown in Fig.2. The convection area of 2003 is the largest although the CAPE is small, while the CAPE is large but the convection area is small in 2001and 2002.

The front determined by weather map of JMA always cross the center of basin or swing over the basin during the Meiyu period of 2003, namely there were many cases of southward movement of cold front during this period. It is considered that synoptic scale upward movement triggered the releasing of instable energy and intensive convection system frequently developed around or north of front due to the southward spreading of cold air.

On the other hand, the average of position of the Meiyu front located around 30-32N in July, 32-34N in June 2002, and both of that slight shifted southward in 2001. To the north of front, the convective echo was limited due to synoptic downward movement and relatively dry environment. Meanwhile, the convective echoes developed around or south of the Meiyu front are shallower and weaker than that of the cold front in 2003. Hence, the averaged reflectivity above 3km in 2001 and 2002 were weak.

In brief, the strong echoes in 2003 is due to southward movement of several cases of cold front and the echoes developed north of front, and echoes developed south of front is main reason why echoes developed in 2002 and 2001 were weak. Common characteristics of convective echoes for three years are that the shallow convection predominates most of observational area during the Meiyu season.

4. Conclusion

The annual variation of convective echoes above 3 km for three years reflected the different characteristics of precipitation system relating to the location of the Meiyu front. On the other hand, there is no distinct annual variation below 3 km because of predominating of shallow convection during the Meiyu season.

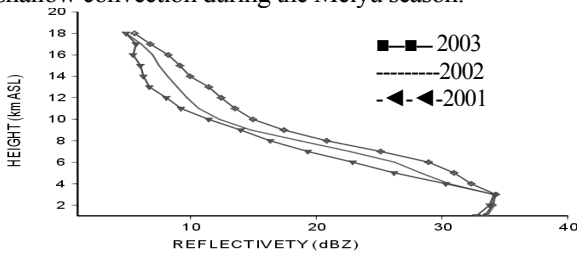

Fig.1 Vertical profile of reflectivity.

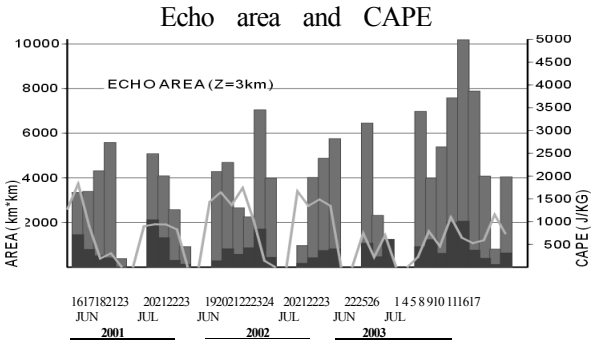

Fig.2 Variation of daily echo area and daily CAPE. Line expresses mean CAPE (at 02 08 14 20 BST by RANAL), column expresses echo area, heavy shaded area > 35dBZ, light shaded area > 15dBZ.