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The characteristics of east-moving MCS over the second-step terrain along Middle Yangtze River in East China

Yuanchun Zhang (1), Ruyi Yang (2), and Jianhua Sun (1)

(1) Institute of Atmospheric Physics, Chinese Academy of Sciences, China (zhyc@mail.iap.ac.cn), (2) Graduate University of the Chinese Academy of Sciences, Beijing,China

A total of 316 eastward-moving mesoscale convective systems (MCSs) are identified over the second step terrain during May to August 2000∼2016 (except 2005) based on the hourly black body temperature (TBB). The annual average number of the MCSs is 19.75 with the apparent annual variation. Due to the favorable ambient circulation in July, the monthly number of MCSs maximizes in July. The duration of the MCSs lasts from three to dozens of hours. Most of the MCSs appear in the afternoon to the early evening at the eastern edge of the second step terrain. Then, they reach the mature status after about four hours later over the middle of the Yangtze River. However, the termination locations and times differs from the middle of the Yangtze River to the eastern oceans. According to their trajectories and locations, the eastward-moving MCSs are divided into four categories (C1, C2, C3 and C4) and composite background circulations are compared. C1 moves northeastward with the average 16-hour lifespan. From upper to middle levels, the low trough at 500 hPa over Sichuan Basin favors the MCSs forms at the eastern edge of the second step terrain and steers the MCS moving northeastward to North China; As for the cases of C2, the average lifespan is 9 hours. The westerly wind in the mid-level over the second step terrain and the weak lower level jet make the MCSs maintains over the eastern edge of the second step terrain and the middle of Yangtze River. The composite circulation of C3 shows that southwesterly wind and the abundant water vapor from the land to the oceans favors the MCSs moving eastward and lasting for longer time (20-hour lifespan); Nearly half of the MCSs are classified into C4. The stronger cyclonic shear at eastern edge of the second step terrain are conducive to more MCSs occurrence. Southwesterly steering wind and stronger water vapor flux force these MCSs maintains for 9 hours over the middle of Yangtze River.