

Observational analysis on lightning feature and merger process in a multicell hailstorm triggered by sea-breeze front

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Abstract

The observational data from Doppler radar, SAFIR3000 three-dimensional lightning position system, microwave radiometer, and from high-density meteorology automatic stations were used to analyze a big hail case caused by a multicell hailstorm which connected with a sea breeze front on west coast of Bohai bay. The characteristic of merger process, lightning activity and quantificational structures of hailstorm were studied. The result show that: **Firstly**, the moisture and cold sea breeze convergence line in the local instable region on ground was the mechanism for storms' triggering and developing with the time of early warning for hailstorm was 2 hours. **Secondly**, there were two merger type of γ -mesoscale convective cell and small β -mesoscale convective cells, that is the independence type, and the feeder type. As cells merging, the cloud bridge between two cells emerged at height of 4-6km or 9-10km. **Thirdly**, at the time of merging, the development of storm was limited and hailfall and the peak of lightning emerged after merger. **Fourthly**, the relationship the evolution of quantificational storm 3D-structure (time-height cross sections of the radar parameters of Z_{max} , Z_{mean15} , v_{40} , v_{50} , *et al*) with lightning activity was investigated, with the result that the radar parameters for *upFV40*, *downFV40* and *etS11* were able to describe properly the feature of merger process and the change of hailstorm structures, and pulled ahead of total lightning flash peak for 12min.

Key word lightning multi-cell hailstorm merge radar parameter
sea breeze front