



Observational Analysis and Simulation of Thunderstorms Triggered by Sea Breeze Front in Bohai Bay

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The convective storm associated with sea-breeze fronts (SBFs), gust fronts (GFs), and their collision are analyzed using Tianjin Doppler radar data and high-density meteorology automatic stations in the Bohai Bay region from June to September during 2009-2015. The synoptic characteristics of SBFs have been analyzed statistically, including its initial time, frequency and the evolution of thunderstorm triggered by SBFs. The results show that: 150 cases of SBFs were discovered, among 56 cases are merged with GFs. The thunderstorms incline to happened less than 20 km of the merged SBFs and GFs.

Then, based on the results of WRF mesoscale numerical model simulation, a typical local thunderstorm case was detailed analysis. The numerical simulation method was analyzed the occurrence, developing and evolution characteristics of the thunderstorms triggered by the merger process of SBF and GF occurred on 14 July 2011, which conducted using WRF model with a high horizontal resolution (1.333 km). The simulation results show that an occlusion process occurs in this merger case, which accompany with convective storms. In the initial stage of occlusion process, the SBF move forward inland gradually; while the GF, which emanated from storms on the Northwester of the Bohai Bay region, propagated more rapidly than the SBF. As the two fronts move towards each other, the warm air between them is squeezed and separated from the surface. An atypical occluded front is formed when the two fronts merger, with the warm air forced aloft. Moreover, local convection is enhanced during the merger process, with severe convective weather produced in the merger area.