

## **Dynamics of two episodes of high winds produced by an unusually long-lived** quasi-linear convective system in South China

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## Background

- Quasi-linear convective system (QLCS): linearly-oriented zone of convection (i.e., thunderstorms).
- Derecho: convectively induced straight-line winds near the surface.



Wakimoto, 2006

### **Observations**——QLCS merged with a decaying MCS



What are the mechanisms responsible for the two episodes of high winds?

- Simulations—Pre-merger
- The first episode high winds resulted from the  $\geq$ descending rear-inflow jet (RIJ)



#### $-\frac{1}{\bar{\rho}}\frac{\partial p_d'}{\partial z} - \frac{1}{\bar{\rho}}\frac{\partial p_b'}{\partial z} + g\left[\frac{\theta - \bar{\theta}}{\bar{\theta}} + 0.61(q_v - \overline{q_v}) - q_h\right]$ Dw Dt

B HL



#### Simulations--Post-merger

The merger enhanced the low-level convergence which increased the vertical vorticity through vertical stretching, resulting in a downward development of line-end vortex .



The second episode high winds was due to the superposition of ambient flow with the low-level rotational flow of the line-end vortex which contributed up to 30%.

