



Three-Dimensional Structure of the 4.24 Squall Line by Dual-Doppler

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There was a squall line moved from Guangxi province to Guangdong province in South China during 23 and 24 April 2007 that brings the heavy rainfall and gale. The 3D wind field of the squall line is retrieved by the Guangzhou and Shenzhen Dual-Doppler radar volume data.

In the mature phase of the squall line, there is a storm-relative front-to-rear flow in the low level of the squall line frontal in the low level clearly. On the other hand, the storm-relative rear-to-front flow is presented at the back of the squall line on the low level. The rear inflow enhances convergence in the frontal of the squall line. On the mid-level (i.e. 5.5km height), the storm-relative front-to-rear flow prevails. Near the density current front, there are strong updrafts at the low and middle level. The downdrafts are located at the back of the squall line. The updraft increases with height at the low and middle level. There are some convergence centres at the density current front on the low level. The value of the strong convergence is less than $-25 \times 10^{-3} \text{ s}^{-1}$. In the vertical cross-section, the storm-relative flow is perpendicular to the quasi-two-dimensional squall line, and there is a rear-to-front flow in the low level of the squall line. In the middle level of the density current front, there is a front to rear flow. Portion of the front-to-rear flow blow backward, and some flow blow upward and then forward with height. The difference between this squall line and the other subtropical squall line is also discussed. The 3D structure conceptual model of the squall line in South China is proposed firstly.

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