An analysis of Convective Vorticity Vector

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A convective vorticity vector ($\frac{\xi \wedge \nabla \theta_e}{\rho}$, CVV) is introduced to identify the development of deep convective systems or severe storms. The CVV is used to diagnose simulation data from a 2-D cloud-resolving model associated with 2-D tropical deep convection. The result indicates that the vertical component of the CVV is closely associated with tropical convection, it takes positive correlation with the sum of the cloud hydrometeor mixing ratios. Therefore, we can use the vertical component of the CVV to track the development of the tropical convective systems.

The daily NCEP/NCAR1˚x1˚ Data is also used to diagnose the distribution of the CVV and moist potential vorticity (MPV) associated with rain storms occurred in the period of Meiyu in 1999. The results have clearly demonstrated that both MPV and the zonal component of the CVV occurred anomalies near the slant Meiyu front. It indicated that the zonal component of the CVV could also be an effective vector for indicating the convective actions against the Meiyu front.