The budget for the vertical component of absolute vorticity $\zeta_z$ in flux form is

$$\frac{\partial \zeta_z}{\partial t} + \nabla_h \cdot (v_h \zeta_z - \zeta_h v_z) = (\nabla \times \mathbf{F})_z$$

where the subscript $h$ indicates horizontal vector components and where $\mathbf{F}$ is the force per unit mass due to turbulent momentum fluxes. (The vertical component of the baroclinic term is neglected here.) The horizontal vorticity flux $v_h \zeta_z - \zeta_h v_z$ can be evaluated in rainy areas from Doppler radar data. If the most important eddy momentum transfers above cloud base are resolved by the Doppler observations, then we need only be concerned about unresolved fluxes in the boundary layer. These can be estimated by a bulk boundary layer model, which means that all pieces of the time tendency of vertical vorticity can be estimated with unprecedented spatial resolution.

This calculation can be carried out in practice using Eldora radar Doppler velocities derived from the 3-D variational analysis scheme of Carlos López. Several examples of the distribution of vorticity tendency and its relationship to convection will be presented for intensifying tropical cyclones in TCS-08.