

Thermal vorticity concepts.

1. Starting with the definitions of u_g and v_g , prove that $\xi_g = \frac{1}{f_0} \nabla_p^2 \phi$. Use this equation to explain why a geopotential height minimum must be associated with cyclonic relative vorticity.
2. Write down an equation for thermal vorticity that is analogous to the equation for geostrophic relative vorticity given in (1). Use this equation to explain why a thickness minimum must be associated with cyclonic thermal vorticity. Sketch a thickness pattern and some thermal wind vectors that represent this scenario.
3. Are anticyclones that are strongest at upper levels cold core or warm core? Use an equation from class notes to make your case.
4. Sketch a cross section of geopotential height showing the representative vertical structure of the anticyclone referred to in (3).