ATM 400: Synoptic Meteorology I
Homework Assignment #2: QG theory and the Sutcliffe–Trenberth ω equation
Due: Thursday, October 17

1. Consider the QG χ equation in a dry, frictionless atmosphere in the Northern Hemisphere. Under the <u>typical synoptic situation</u>, explain why a ***<u>surface</u>*** high pressure system trying to form beneath 500-hPa southwesterly geostrophic flow is highly unlikely to develop. Make sure to consider both the vorticity and temperature advection terms, and assume temperature advection is strongest in the 850–700-hPa layer.

2. Plot a map of 700-hPa height, 1000–500-hPa thickness, and the Sutcliffe–Trenberth forcing for vertical motion at 0000 UTC 14 March 1993. How does this map compare to those you plotted/looked at for Lab #3? In your answer, make sure to address the areas of cancellation between the two leading forcing terms in the QG ω equation that you found in Lab #3, and the match between the Sutcliffe–Trenberth forcing for upward motion and the actual omega.