ATM 400: Synoptic Meteorology I
Lab #2: The QG height tendency equation
Due: Tuesday, September 24

For your second lab assignment, you will interpret four-panel plots depicting the leading forcing functions of the quasigeostrophic (QG) height tendency (χ) equation to answer the questions below.

The four-panel plots, at *http://www.atmos.albany.edu/facstaff/kristen/ATM400/lab2/res.html*, contain the following:

1) Upper left panel: 500-hPa geopotential height (dam; solid contours) and geostrophic absolute vorticity (x 10^{-5} s^{-1}; filled)
2) Upper right panel: 700-hPa geopotential height (dam; solid contours), temperature (°C; dashed contours), and temperature advection by the geostrophic wind (x 10^{-5} °C s^{-1}; filled)
3) Lower left panel: 300-hPa geopotential height (dam; solid contours), temperature (°C; dashed contours), and temperature advection by the geostrophic wind (x 10^{-5} °C s^{-1}; filled)
4) Lower right panel: 500-hPa geopotential height (dam; solid contours) and 500-hPa 12-h centered difference height change (dam; filled)

Please step through all of the times in the loop on the website above, but **only answer the questions** below **for 0000 UTC 13 March** and **0000 UTC 14 March**.

Questions:

1. Focusing only on the trough associated with Superstorm 1993, discuss where the vorticity advection and differential thermal advection would separately predict heights to fall and heights to rise at each time. Describe where the separate forcings constructively or destructively interfere with each other.

2. Based on your analysis from #1, where does the QG χ equation predict heights will fall and rise? Comparing this prediction to the actual height falls and rises, how successful was the QG χ equation? If there are significant differences, what may be causing these differences?