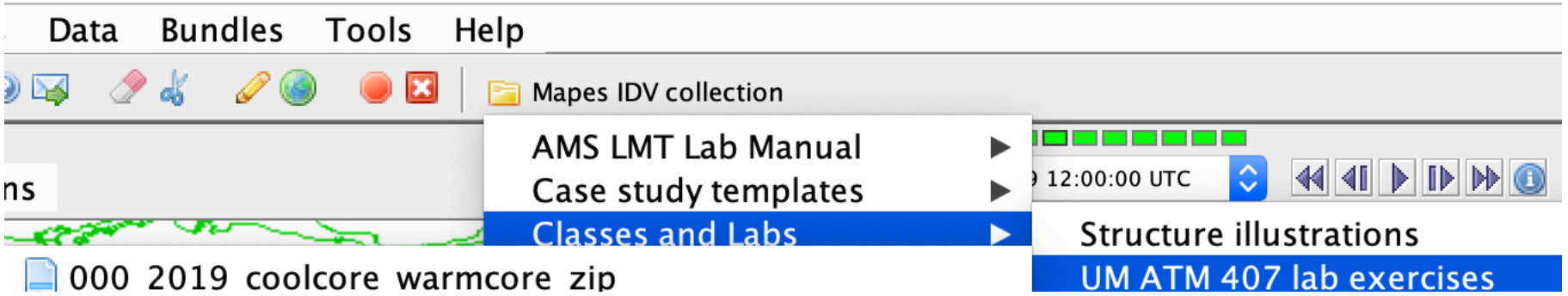
IDV lab assignment -- part 1

- Open Mapes IDV → UM ATM407…
  - 0000_coolcore_warmcore…

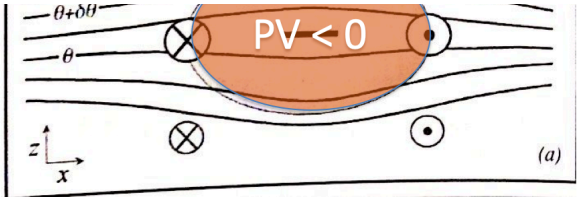


Explore ALL of its displays, at ALL of its times (loop the animation). Learn to use the IDV. The Help menu has pan-zoom help on top. A mouse is a HUGE help for 3D views.

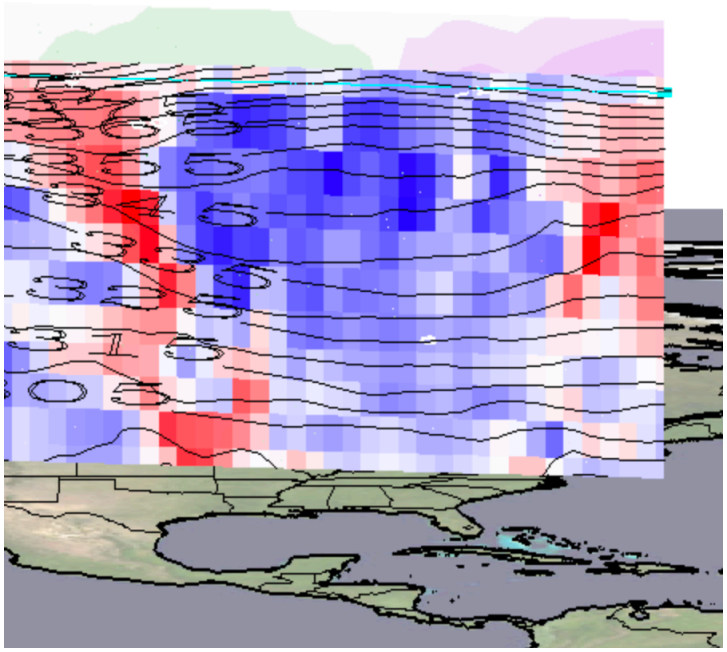
IDV lab assignment -- part 1

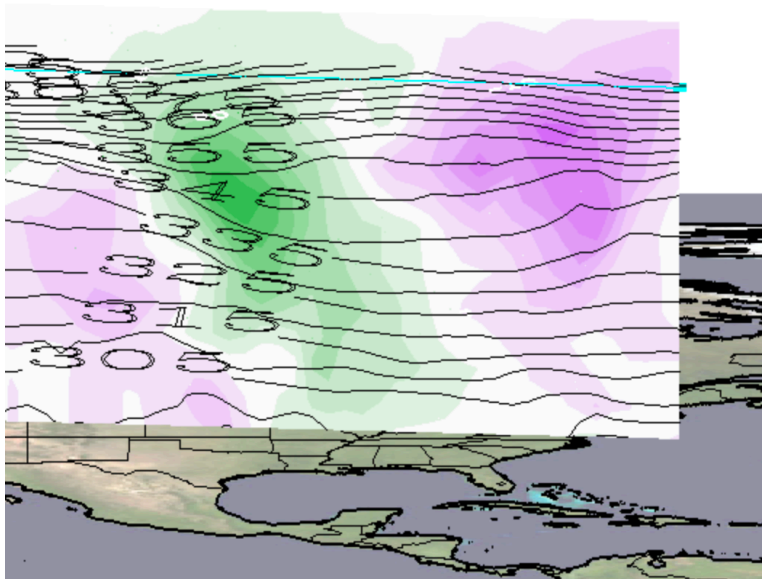
- In the following slides, make and label and explain nice clear illustrations like slides 13-17, but for
  - a warm core anticyclone
  - a warm core cyclone
  - a cool core anticyclone

A warm core anticyclone



- Where? Describe the situation.

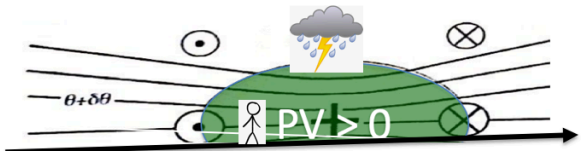


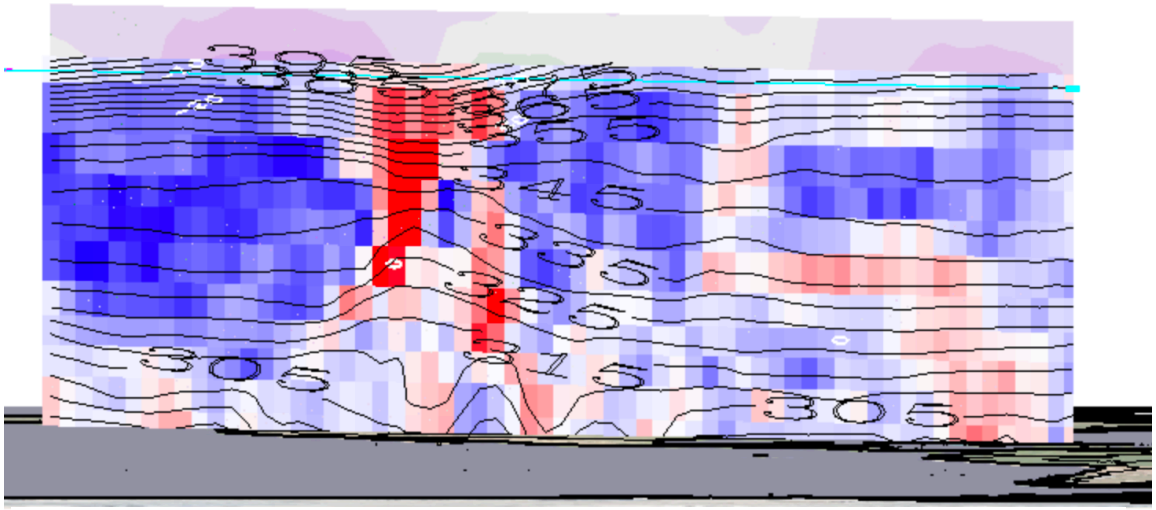


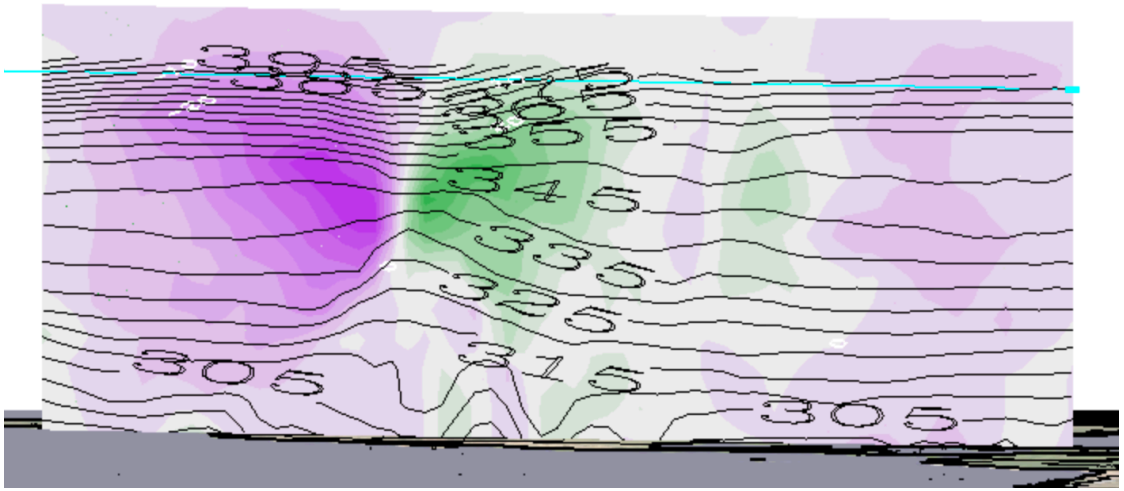
Warm core anti-cyclone evident over central Midwest, shown through bulge in theta contours and anti-cyclonic rotation given through v-component of velocity.

A warm core cyclone

This is called a *warm core cyclone:*



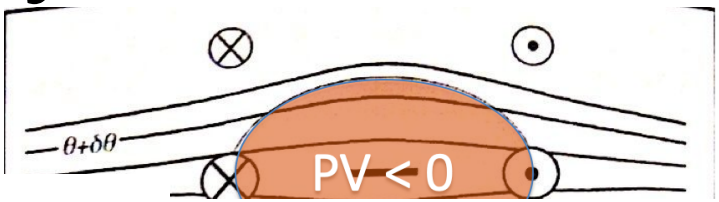




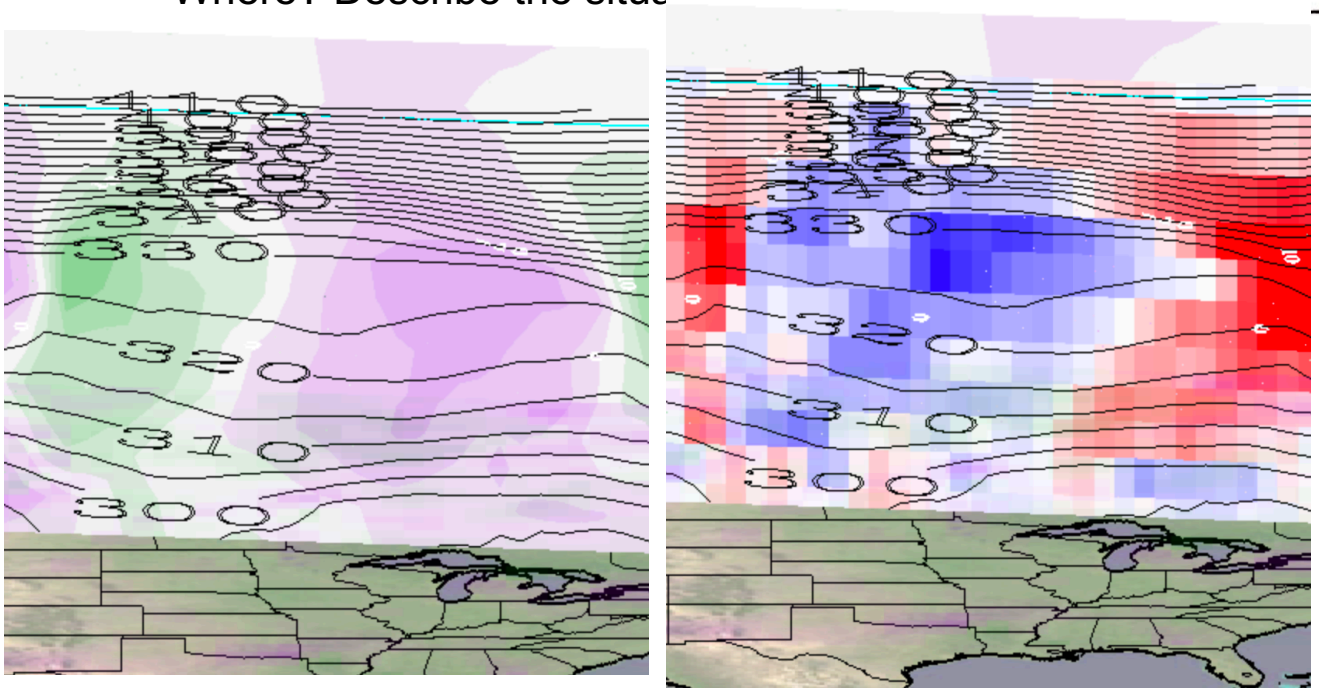
Warm core cyclone evident from bunching of theta contours within atmosphere- sharp temperature gradient.

V-component of wind (since we are looking N/S) shows cyclonic motion around theta area of interest.

A cool core anticyclone



- Where? Describe the situation



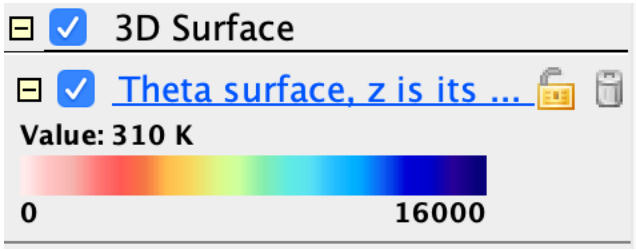
Anti-cyclonic motion shown through the v-component of velocity, cool core evident through bulge in theta contours near surface and concentration with height.

Isentropic surfaces

- Isentrope contours on the cross sections above are *slices of isentropic surfaces*
  - surfaces of constant entropy
    - or potential temperature, or dry static energy $C_pT + gz$
- Let's learn to see isentropic surfaces
- They are almost like *material surfaces*
  - because $D\theta/Dt = 0$ for adiabatic flow
    - *(plus nonadiabatic or "diabatic" complications)*
- Their vertical motion is air vertical motion!
  - the holy grail, for clouds+rain (weather)

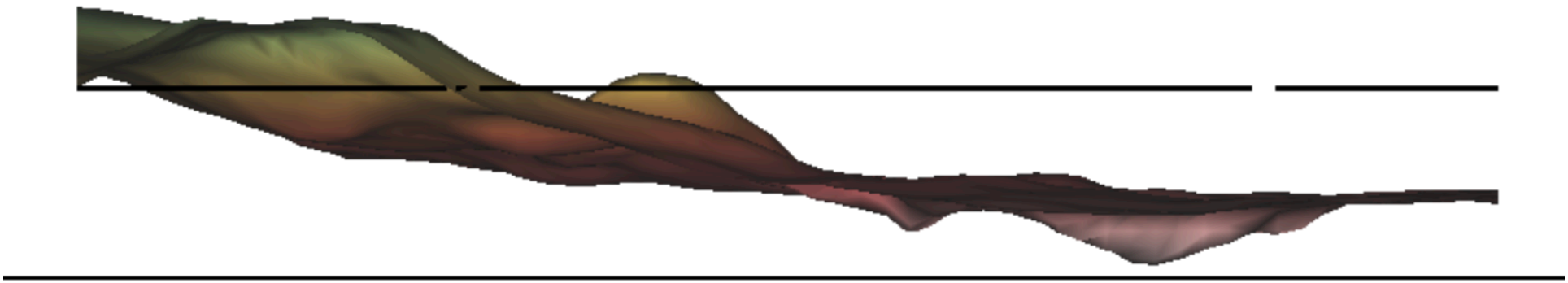
IDV Lab assignment part 2

- In the same bundle, activate (check) the display called “Theta surface, z is its color”



- Adjust the value (310K, 330K, 360K)
- Use vorticity isosurfaces and cross sections in an illustrated description of its topography.
  - Is there a mean north-south slope? hint: 
  - What vorticity features (Part I) explain dimples?
  - What vorticity features (Part I) explain peaks?

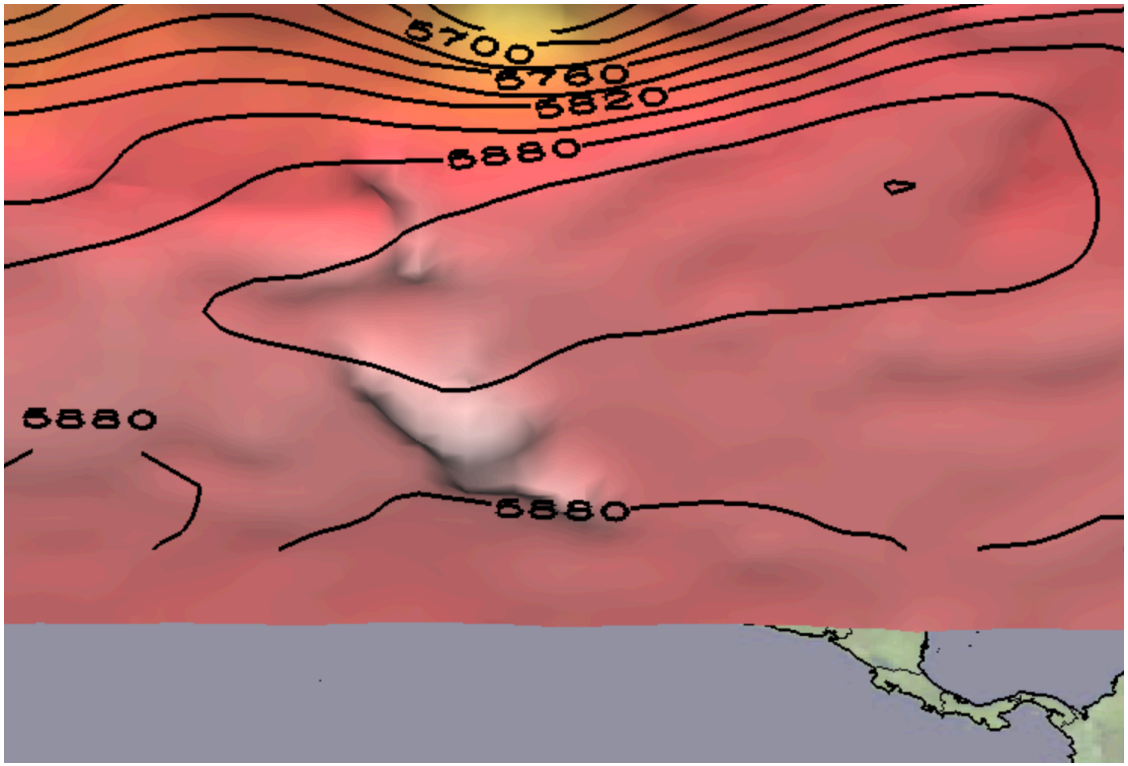
Mean slope of the 310K isosurface



Looking towards East, black line is 500mb level

A depression in the 310K surface

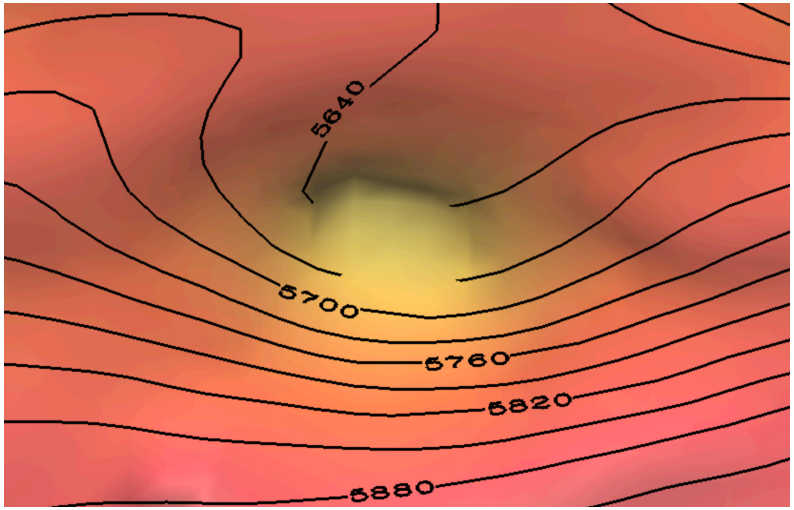
Where? Describe the situation

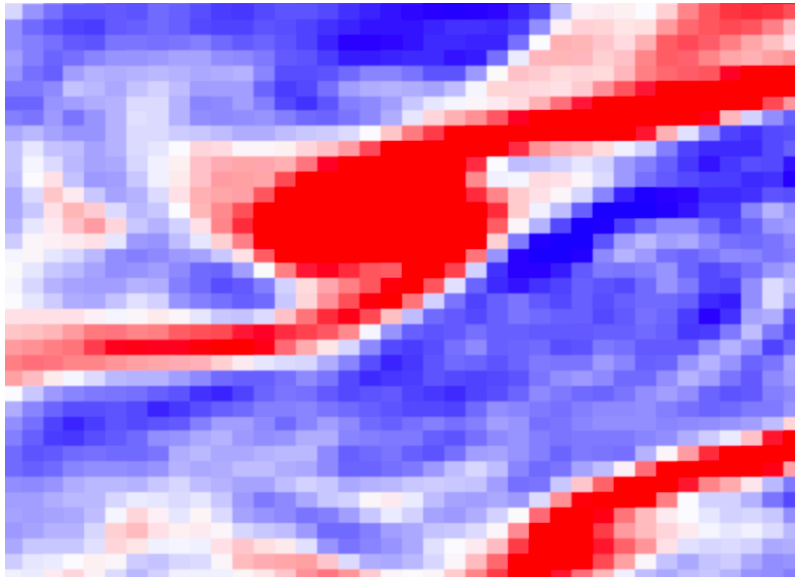


Depression in the 310K isosurface in the hot arid regions of SW United States where the surface temperatures exceed 310K.

A peak on the 310K isosurface

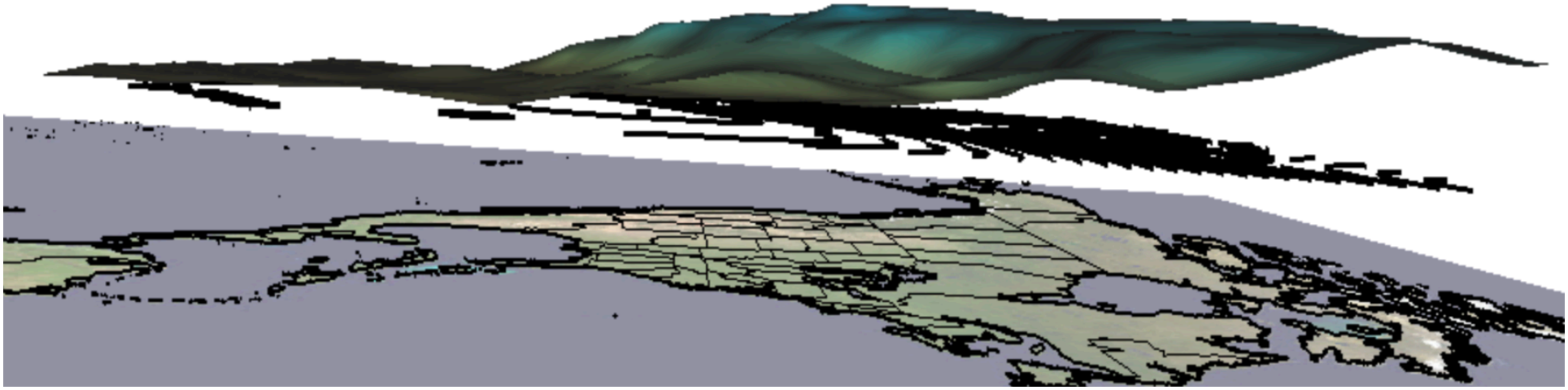
Where? Describe the situation





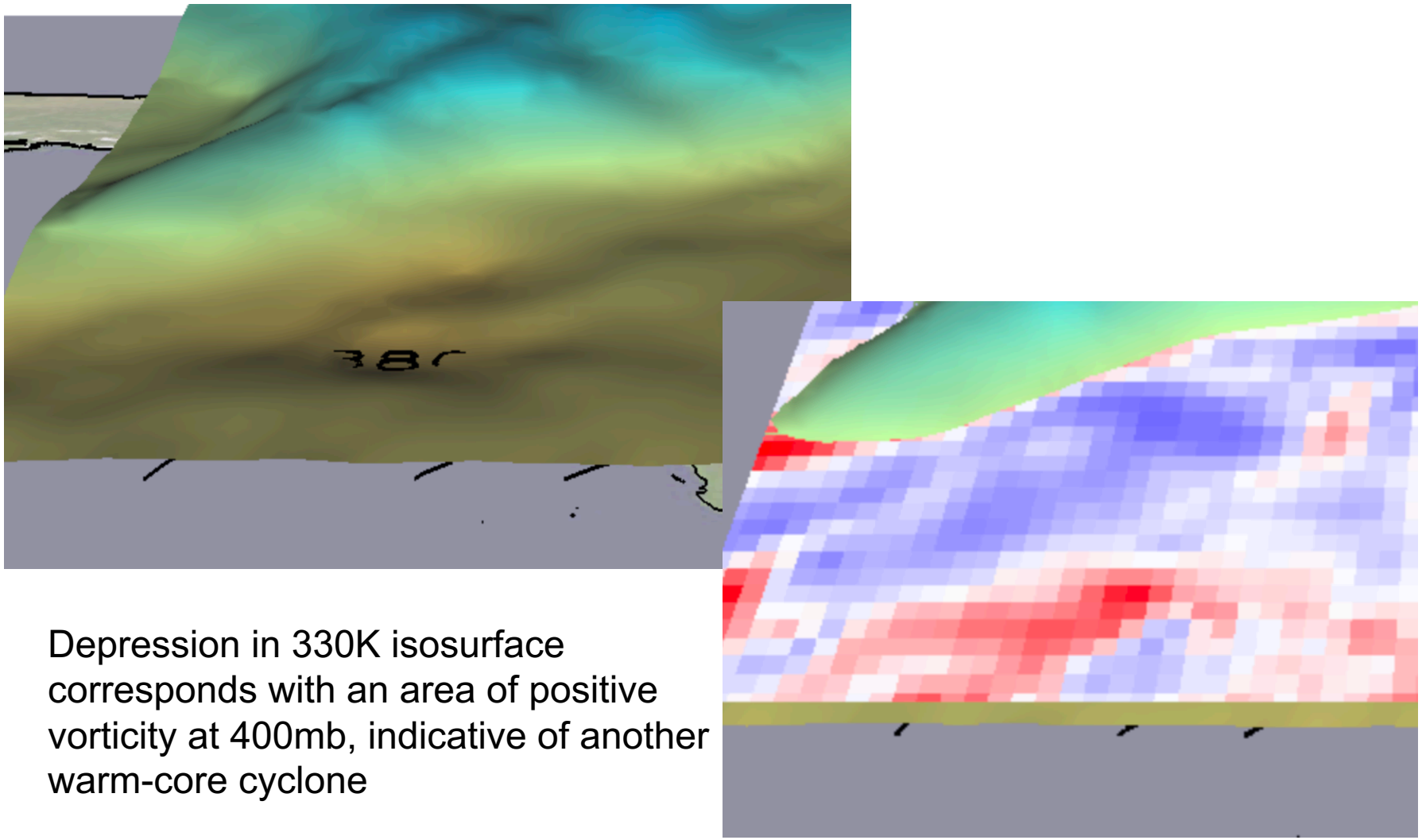
Peak in the 310K isosurface found north of N. Dakota in Canada, high positive vorticity is also present. This could be indication of a warm core cyclone, evident by the warm temperatures found at the 500mb level.

Mean slope of the 330K isosurface



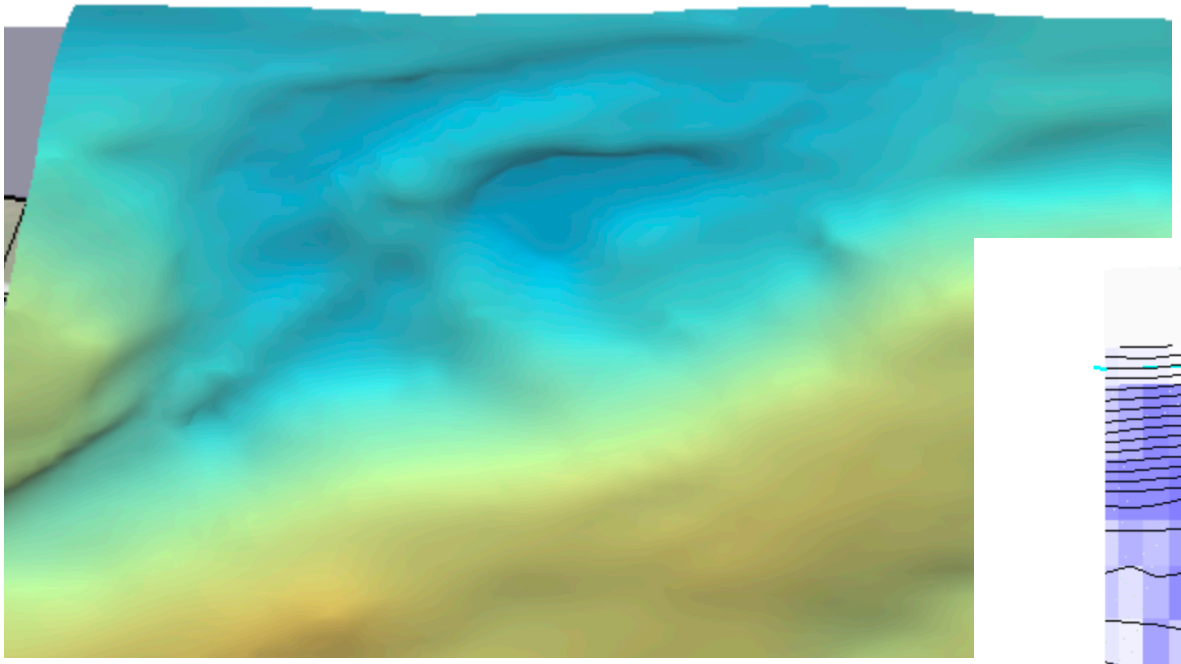
330K isosurface looking towards the West

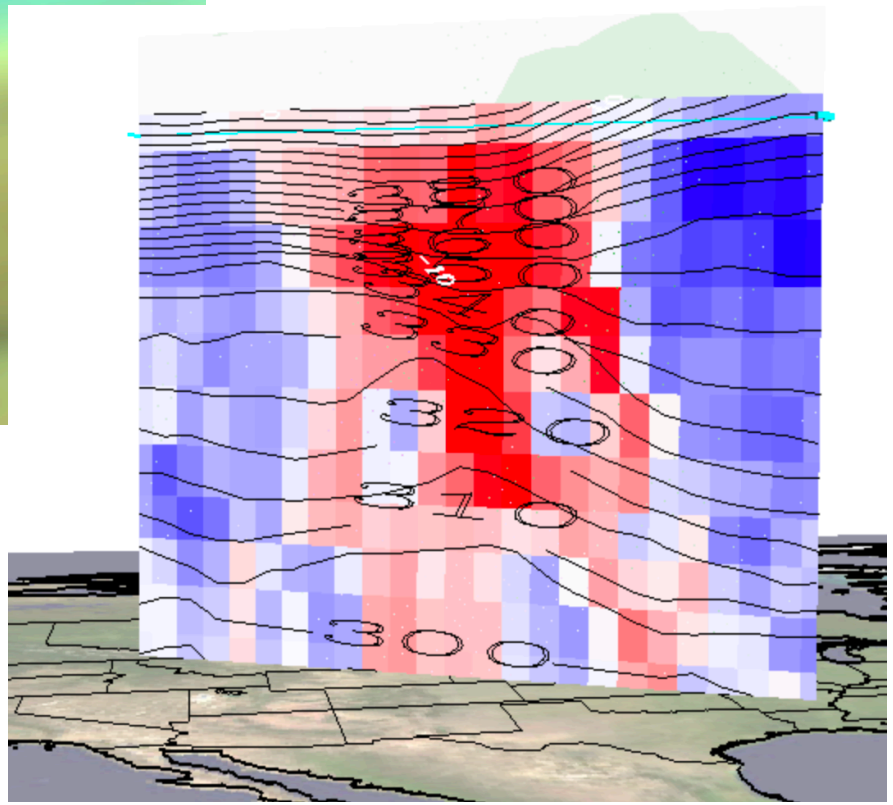
A depression in the 330K surface



Depression in 330K isosurface corresponds with an area of positive vorticity at 400mb, indicative of another warm-core cyclone

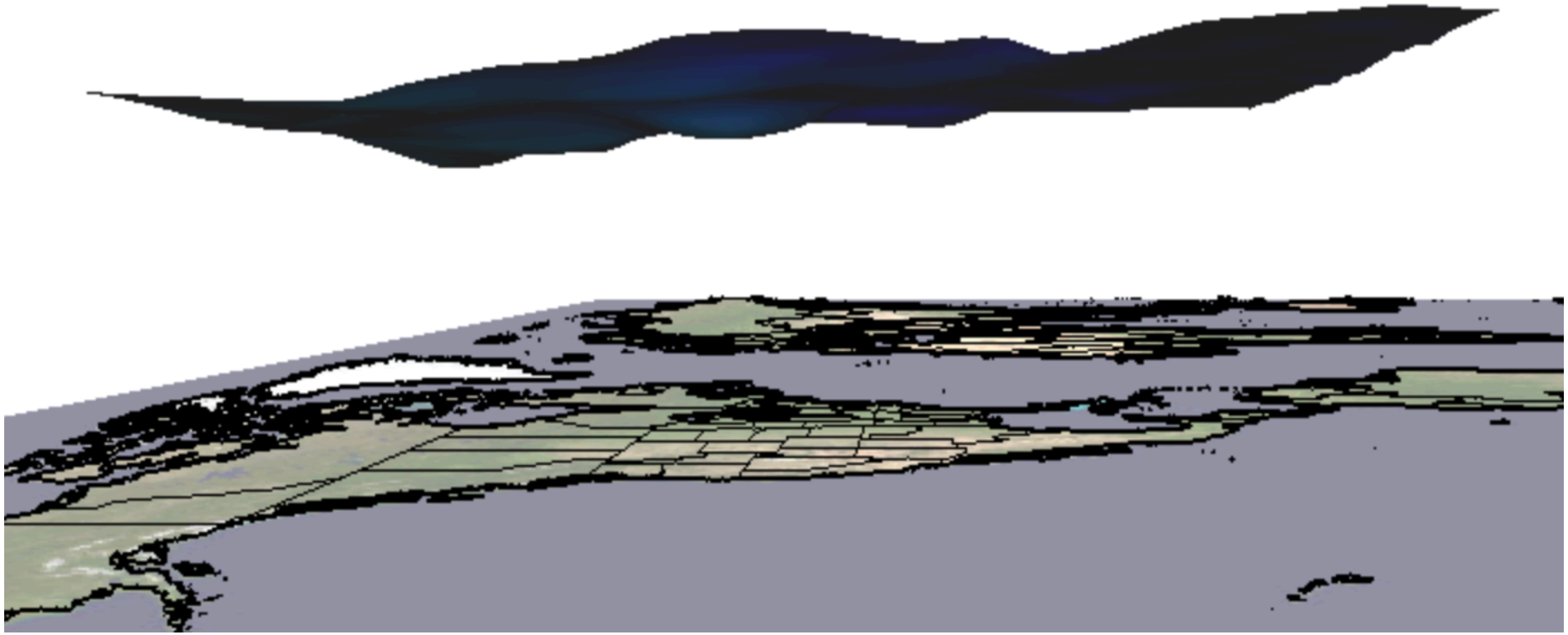
A peak on the 330K isosurface





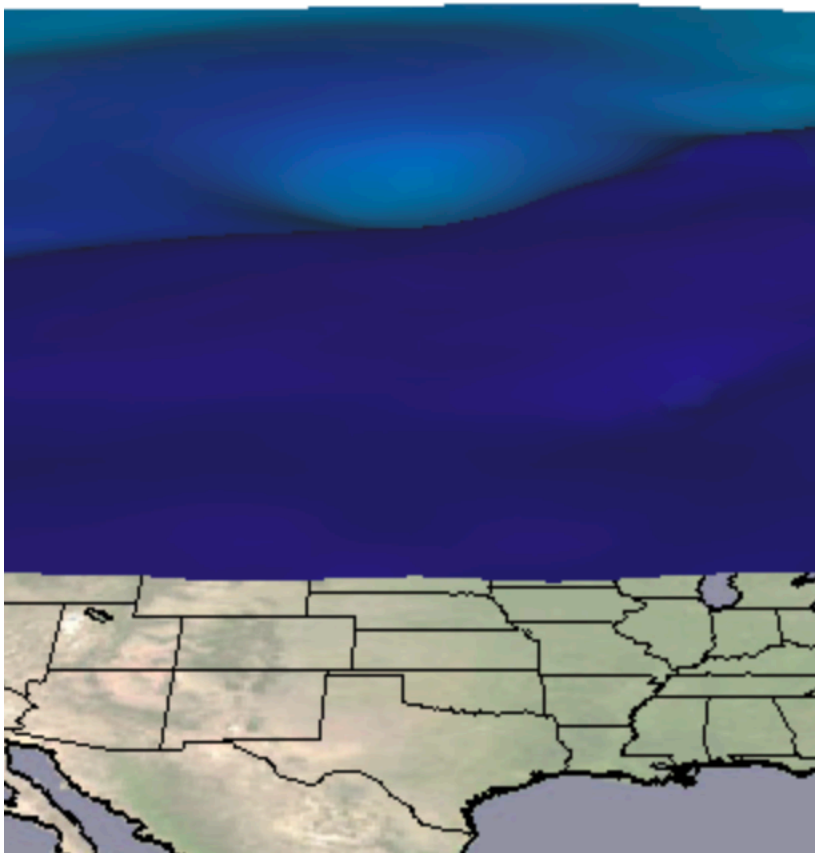
Cross section through the peak in 330K shows high vorticity at height, also with a crunch of temperature contours, indicating a cool core cyclone near the surface, where temps are cooler below and warmer above.

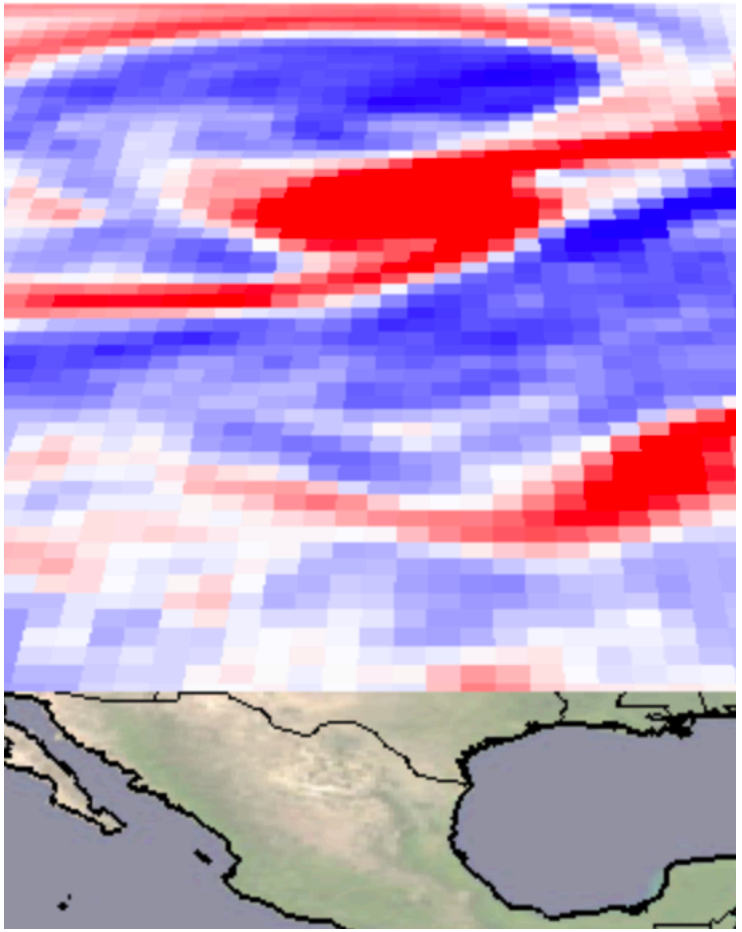
Mean slope of the 360K isosurface



Looking eastward

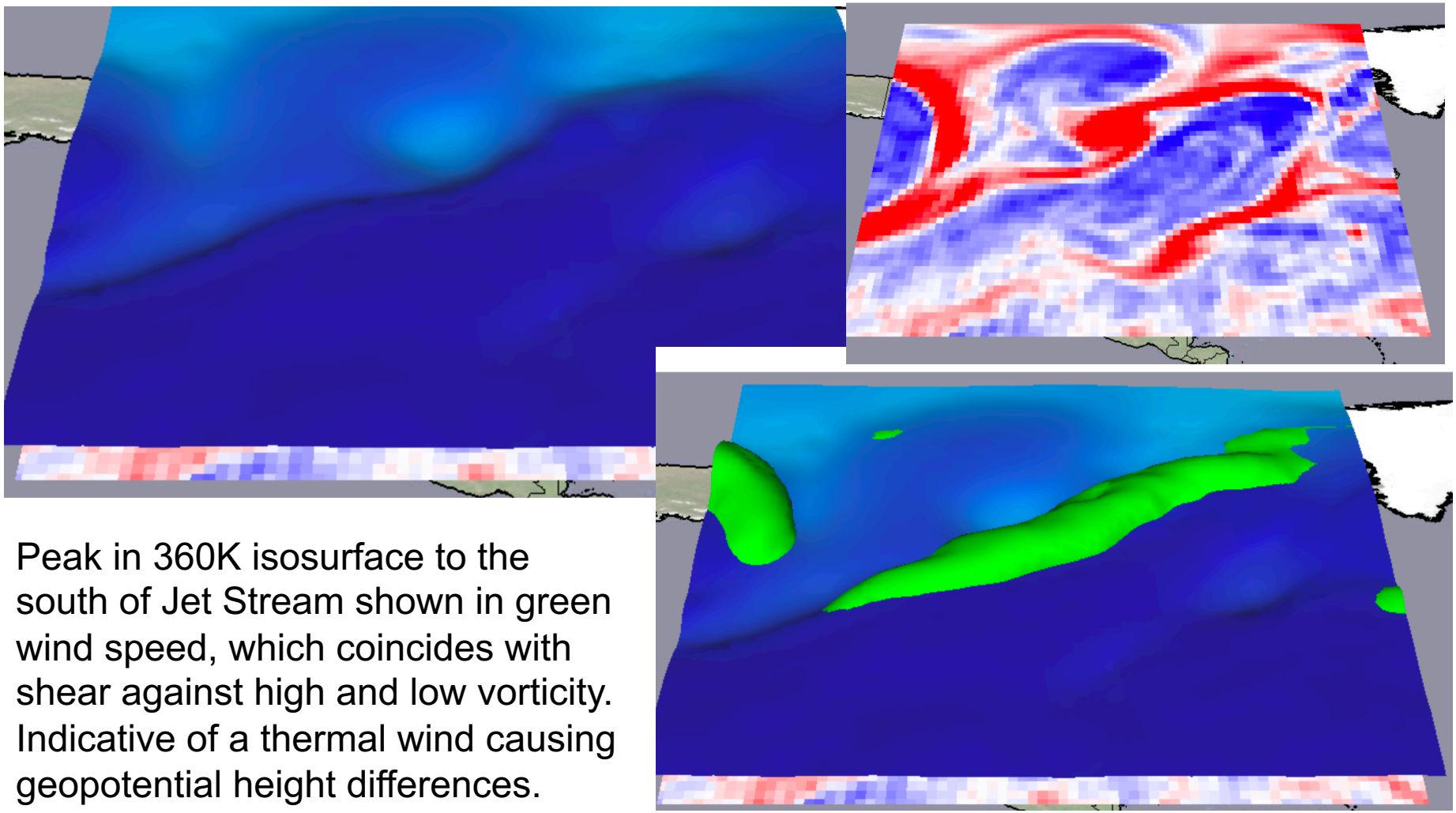
A depression in the 360K surface





Depression in 360K isosurface coincides with area of high vorticity at 250mb, indicative of warm core cyclone aloft, as seen in other isosurface values

A peak on the 360K isosurface



Peak in 360K isosurface to the south of Jet Stream shown in green wind speed, which coincides with shear against high and low vorticity. Indicative of a thermal wind causing geopotential height differences.

Use the Print facility of Powerpoint

- to put a PDF of this into your class Github repository
- so we can look them over in class