

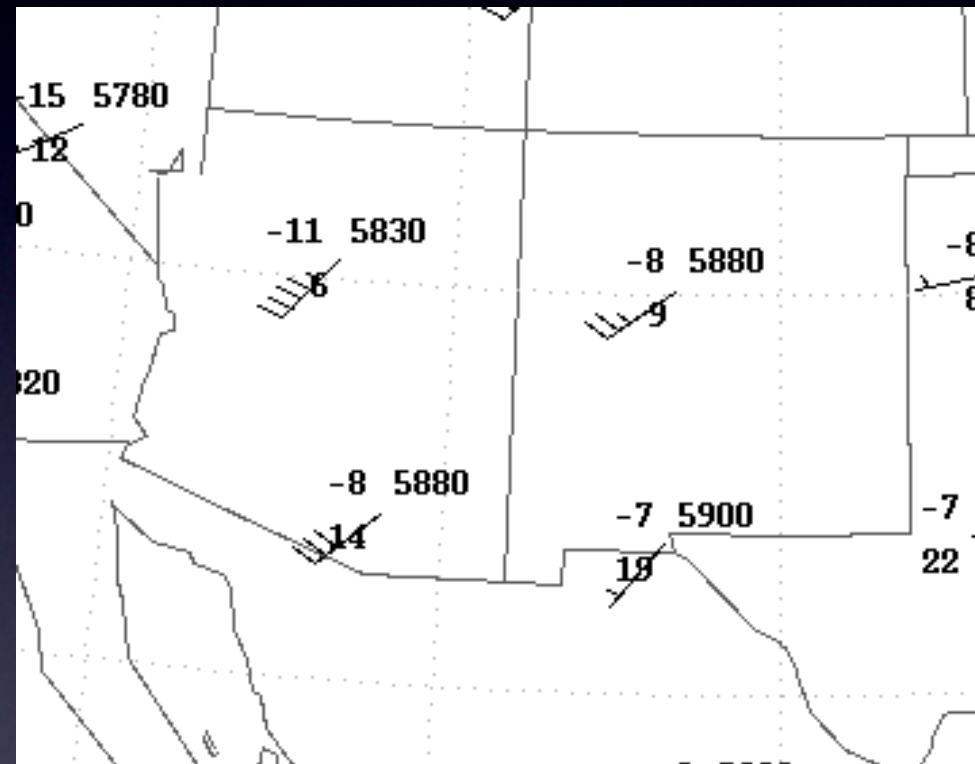
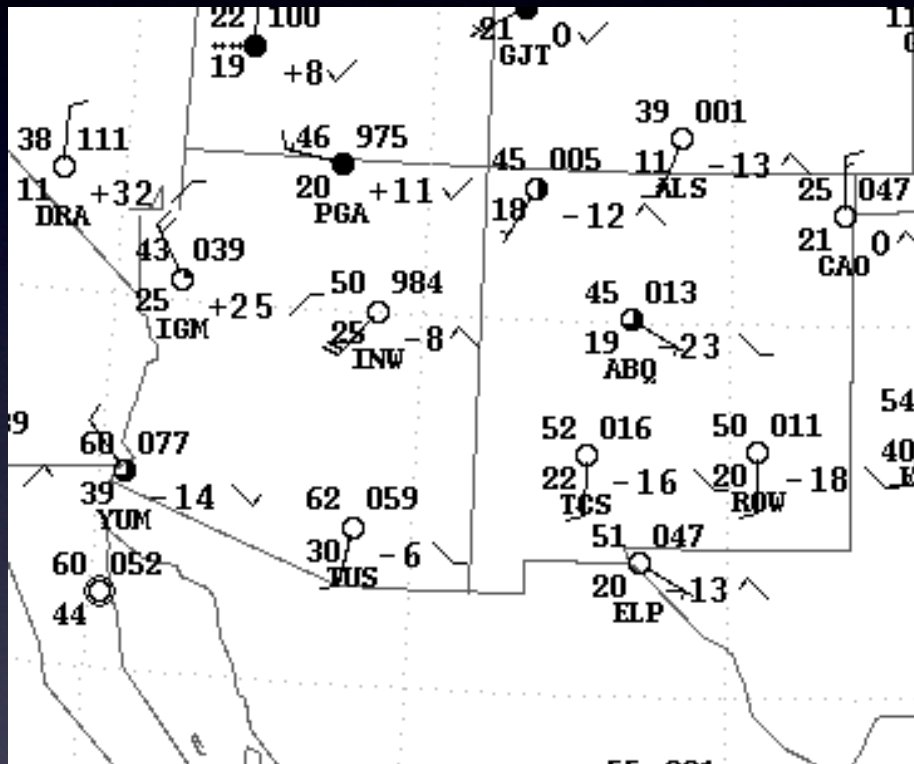
Forecasting Overview

ATMO 325
Jason P. Criscio
24 Oct 2006

Forecasting Fundamentals

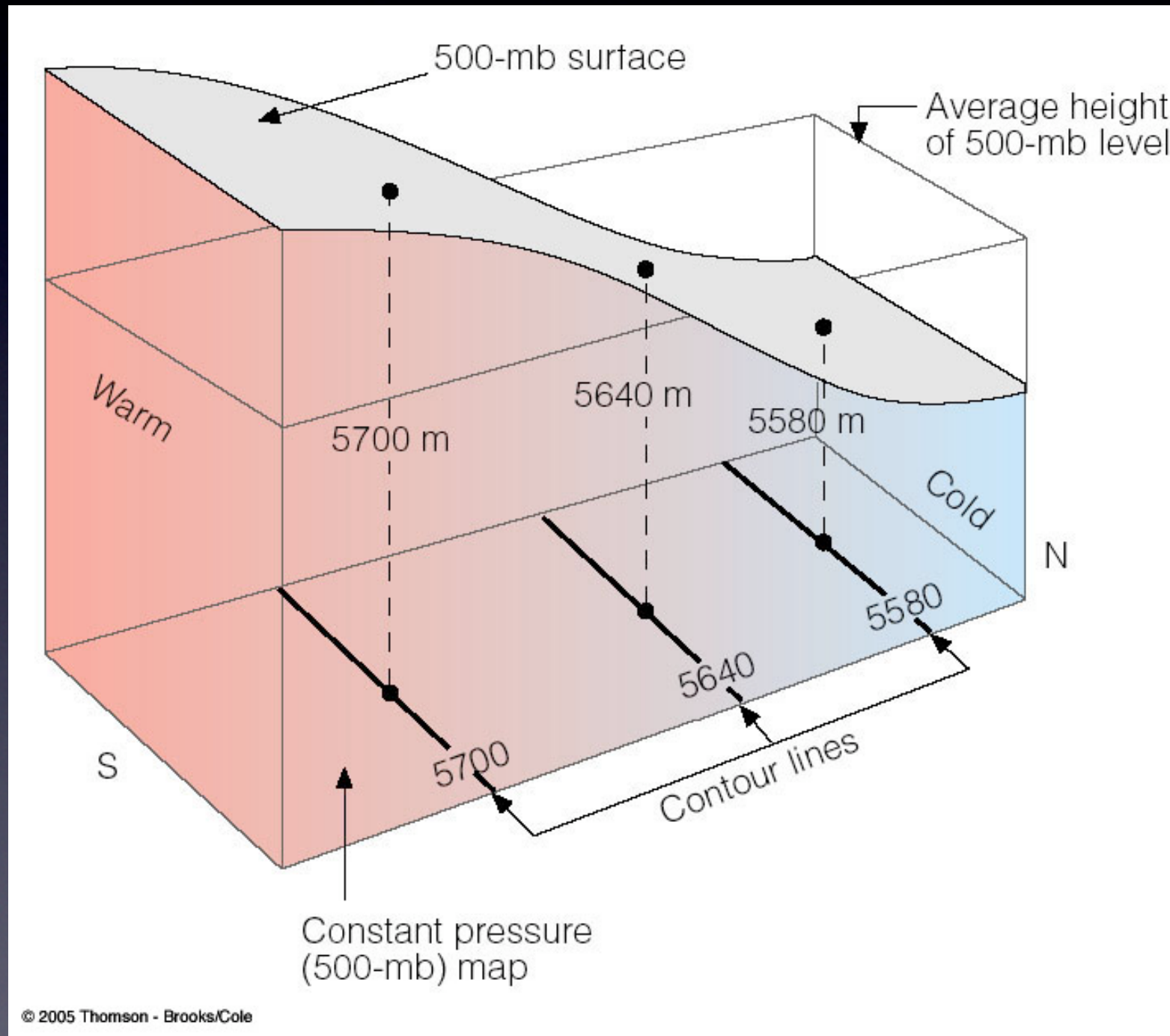
- What *is* forecasting really???
- 1. to predict (a future condition or occurrence); to calculate in advance
- 2. to estimate or calculate in advance, especially to predict (weather conditions) by analysis of meteorological data
- So...What data do we use?

Weather Data

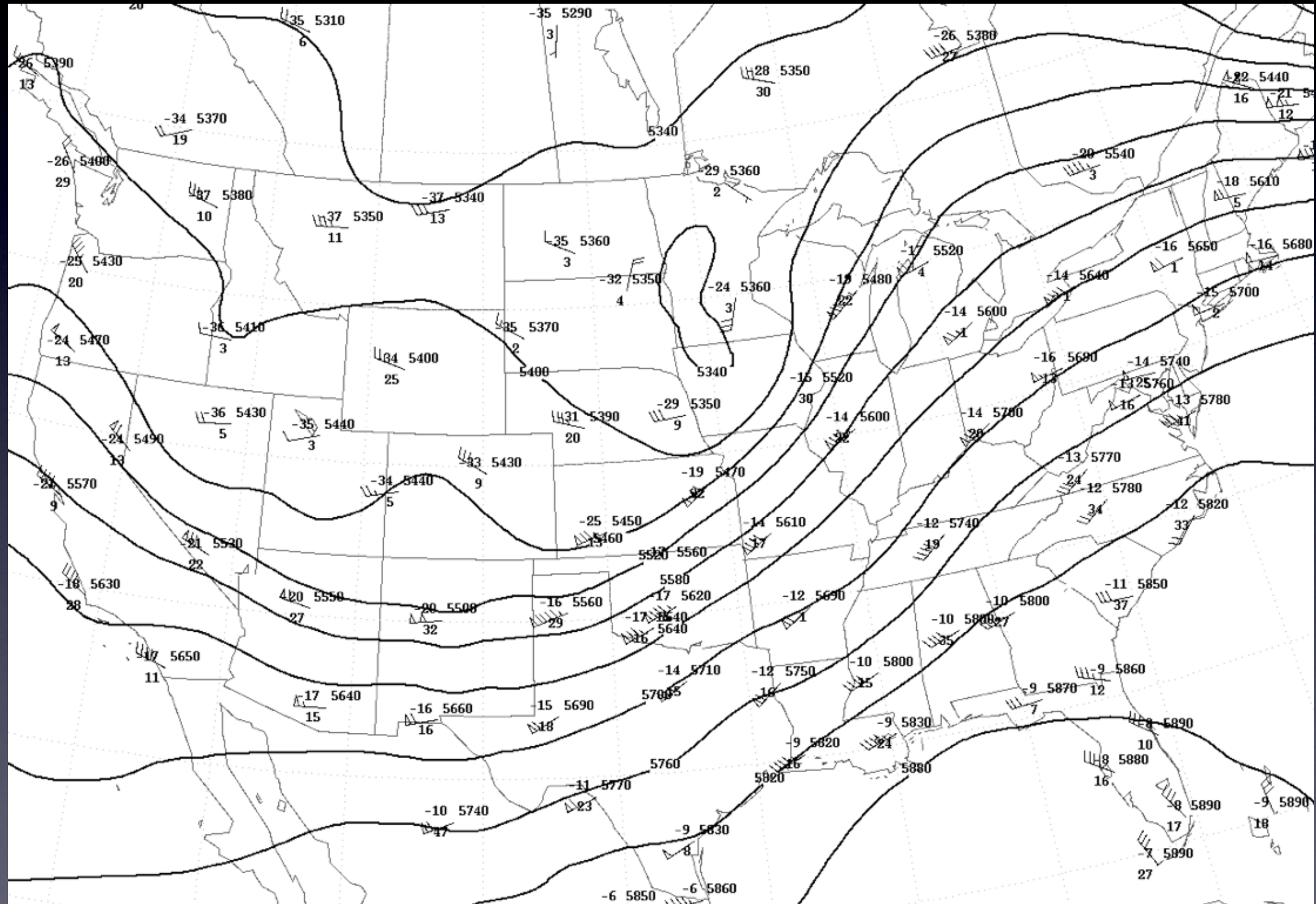


- Surface Station Data (left)
- 500mb/Upper Air Data (right)
- What are we *really* looking at?
- Surface... That's easy! What about 500mb?

500mb/Upper Air Map



500mb/Upper Air Map

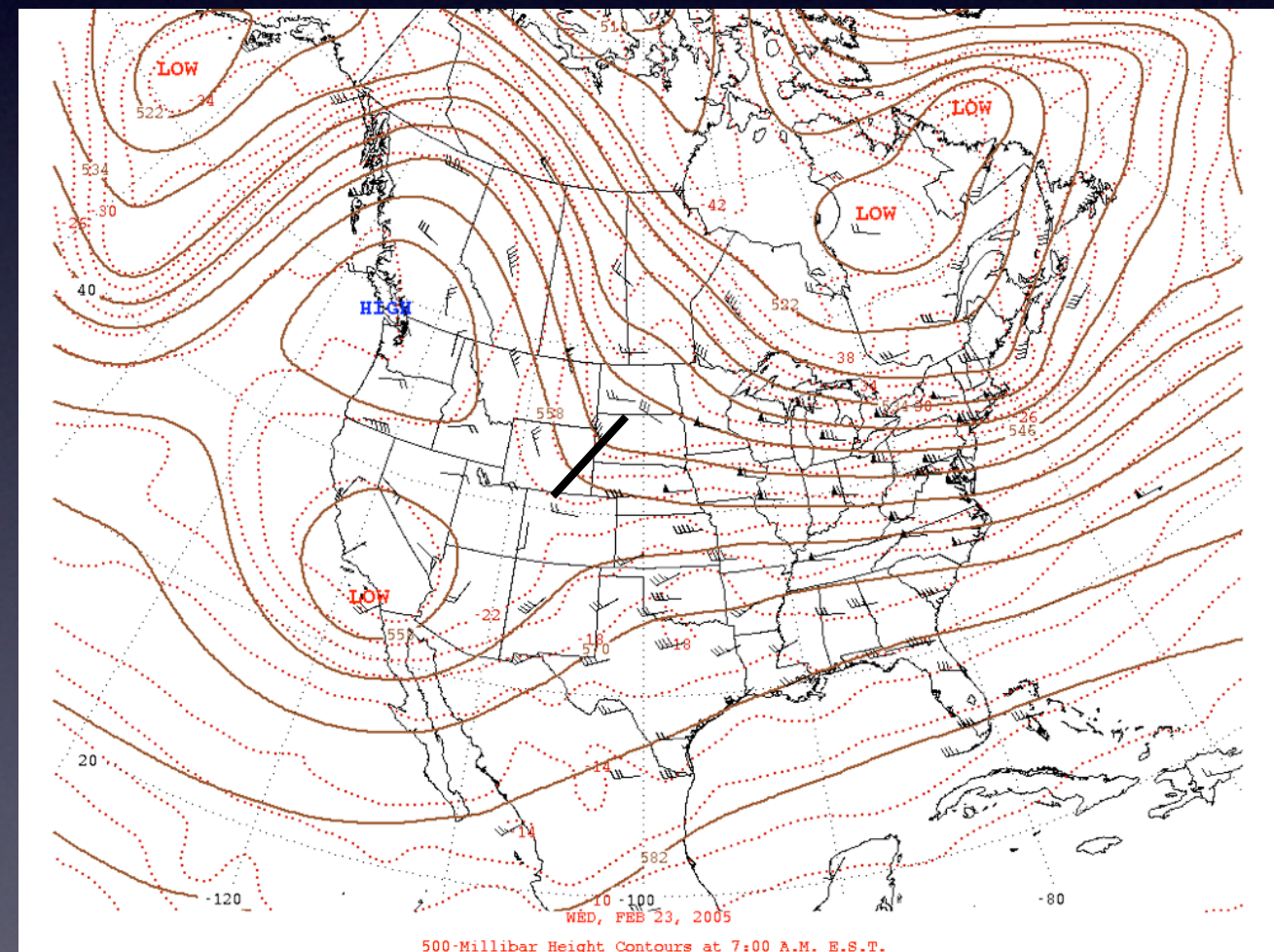
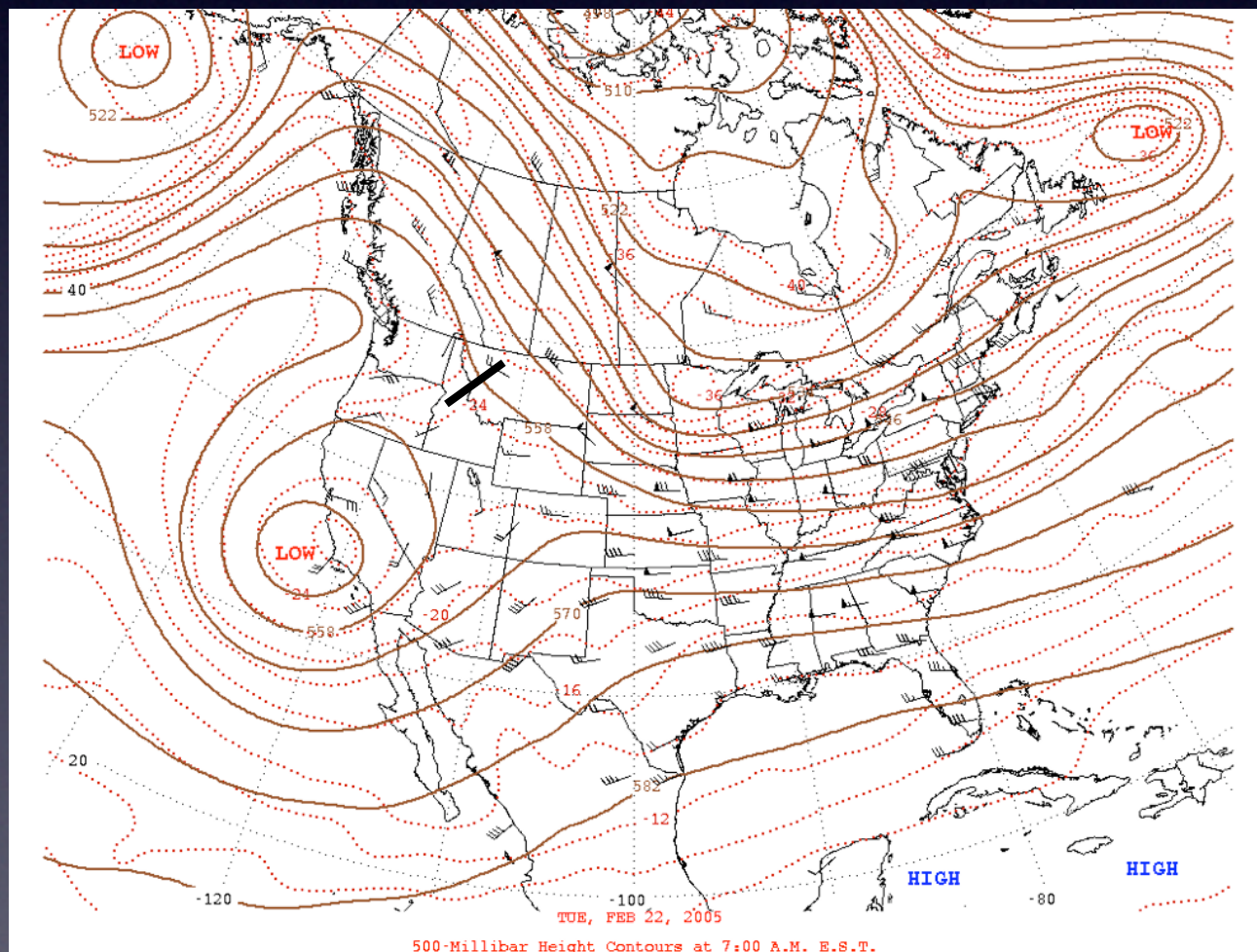


Forecasting Techniques

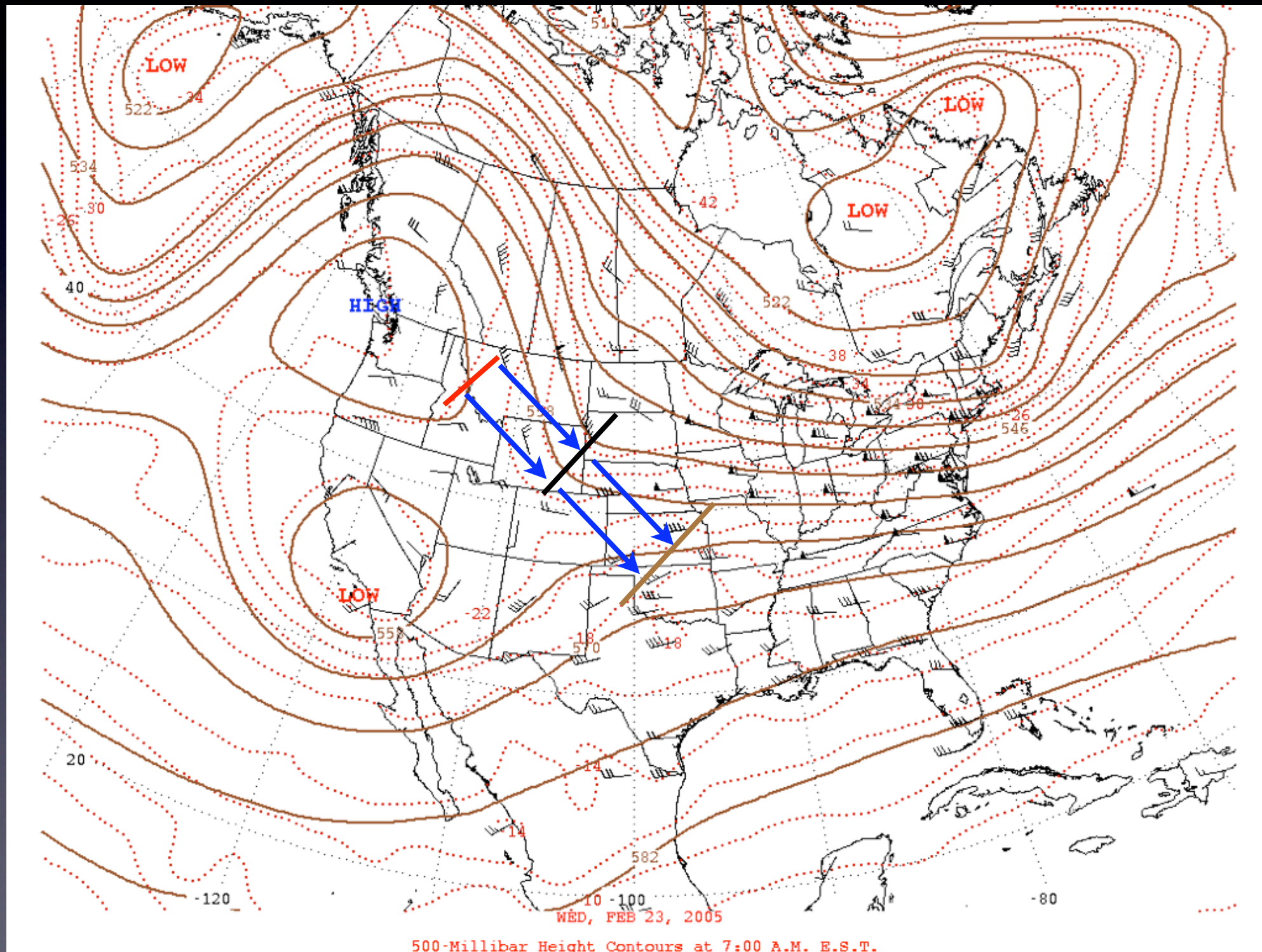
- Four Ways (In This Class) To Predict The Future
 1. Extrapolation
 2. Warm/Cold Advection
 3. Upper Level Lows (“The Wind Rule”)
 4. Steering

Extrapolation

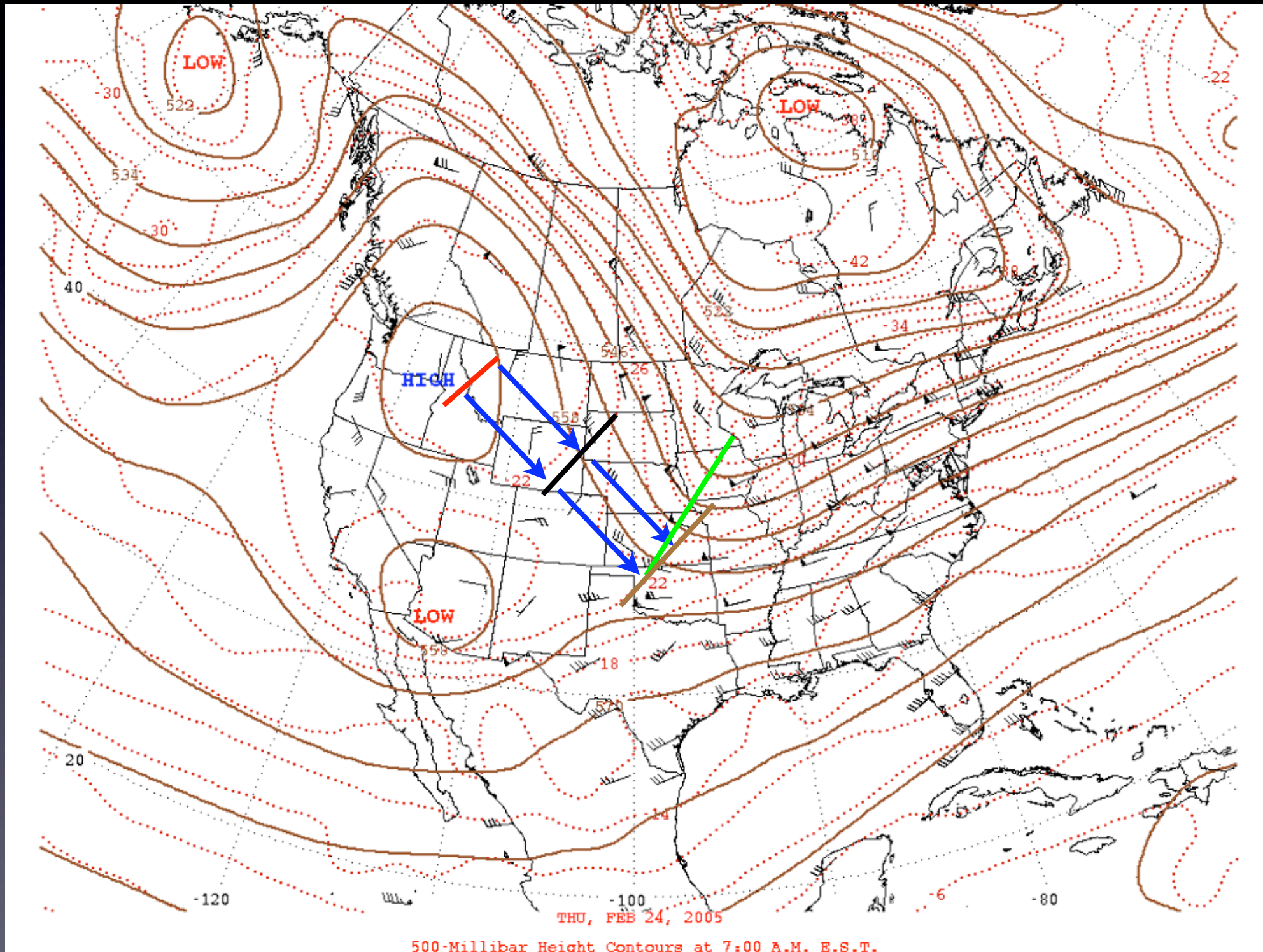
- Easiest of the 4 methods
- “Where was it?” + “Where is it?” = “Where it’s going”



Extrapolation



Extrapolation



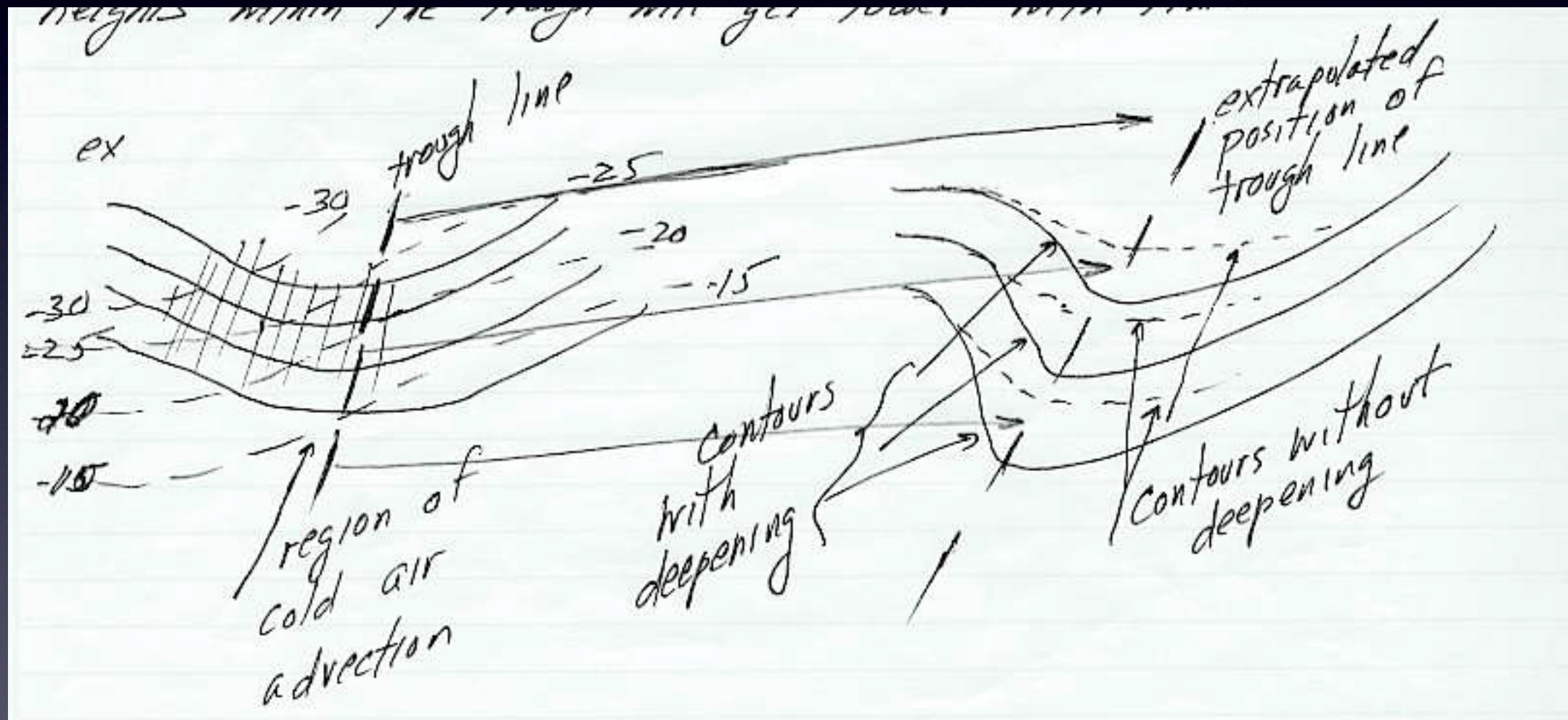
500-Millibar Height Contours at 7:00 A.M. E.S.T.

Extrapolation

- Works for anything!
 - Lows, Highs
 - Fronts
 - UA Football Team (ok, bad, worse... ugh)
- In *this* class, we use extrapolation only for 500mb troughs and ridges
- Tells you where the troughs and ridges are going
- So now we know where the troughs and ridges go, but do we know how they'll look?

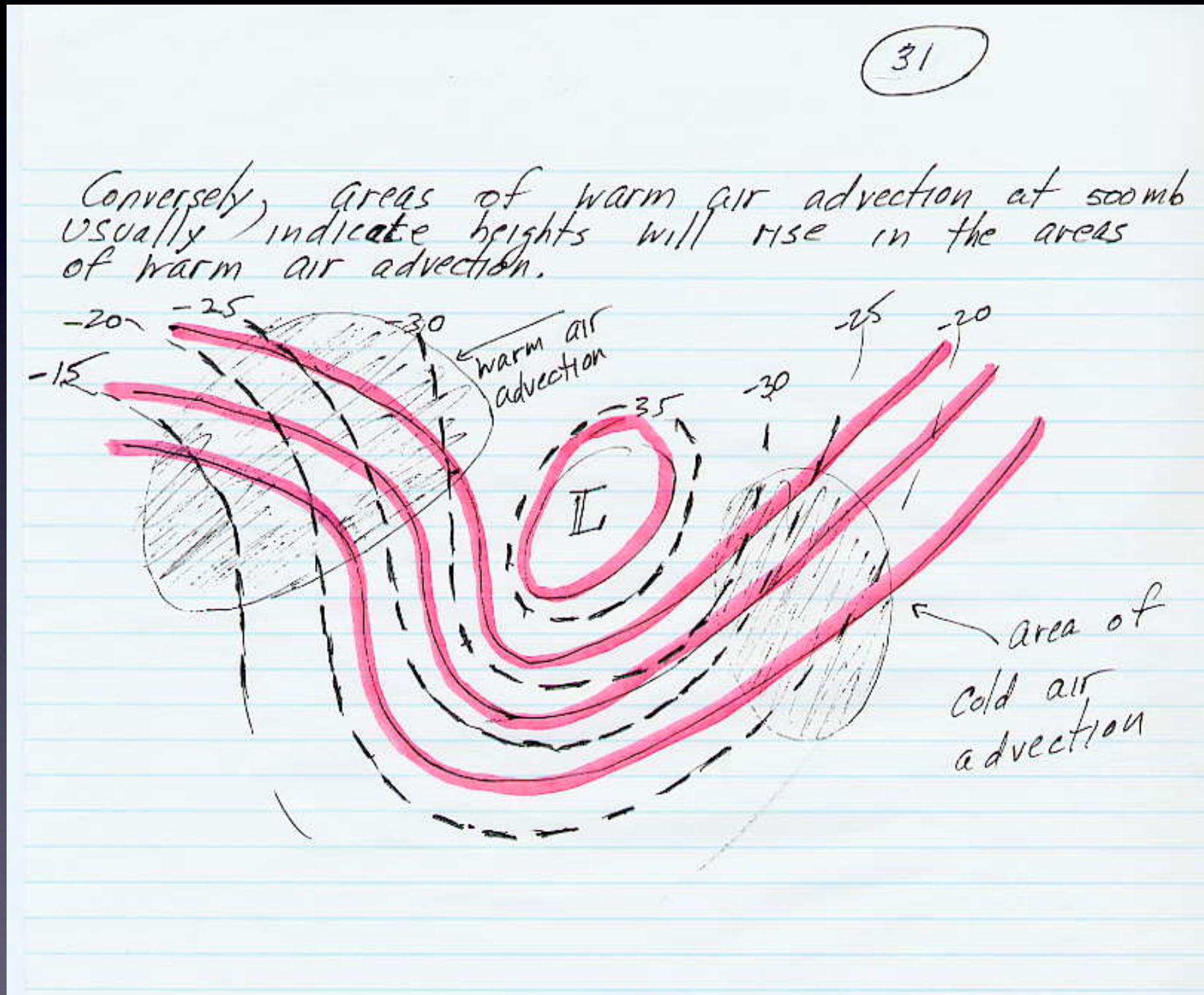
Warm/Cold Advection

- Determines if a trough/ridge gets stronger or weaker

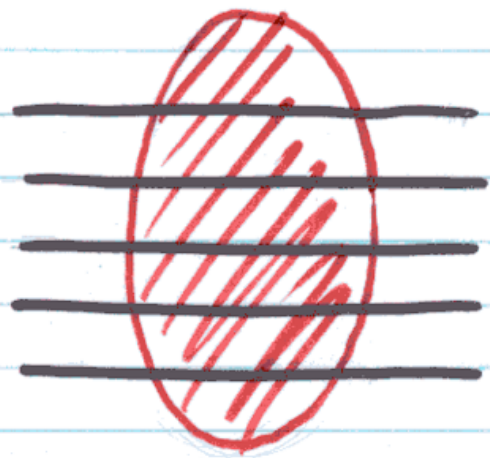


- What the...?
- Advection occurs where height and temperature contours cross

Warm/Cold Advection

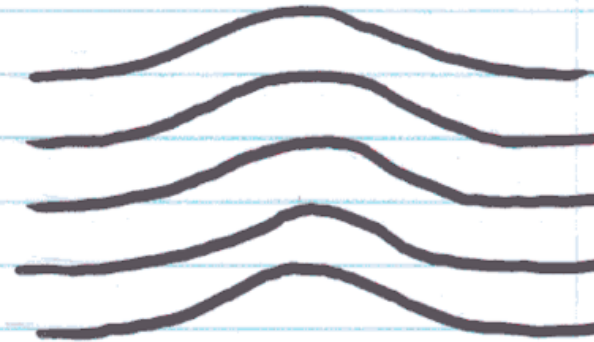


Warm/Cold Advection



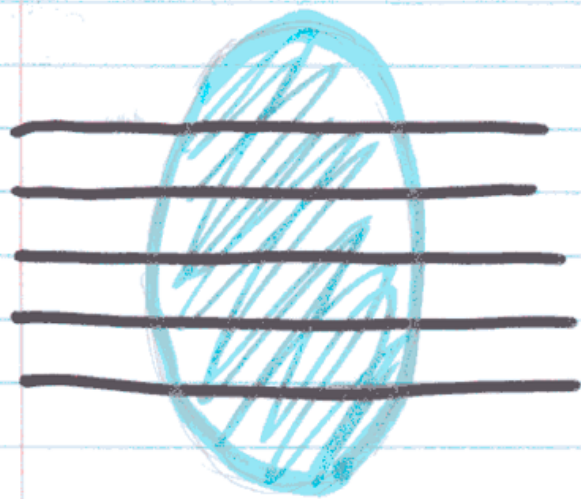
Warm Advection

Initial Time

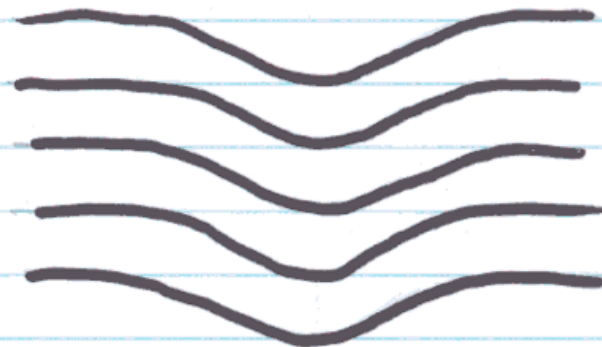


Height Rises

Later Time

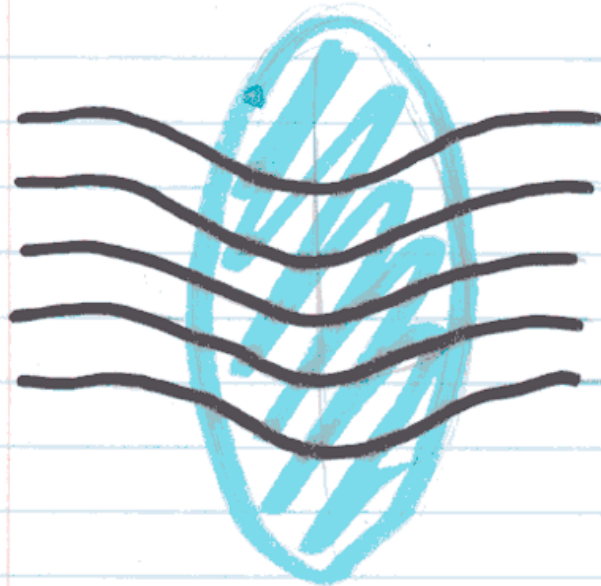


Cold Advection

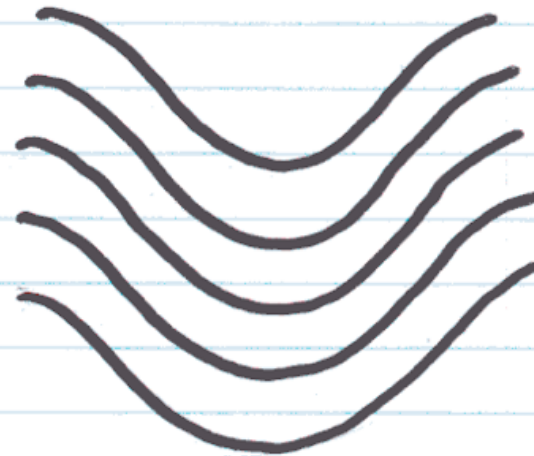


Height Falls

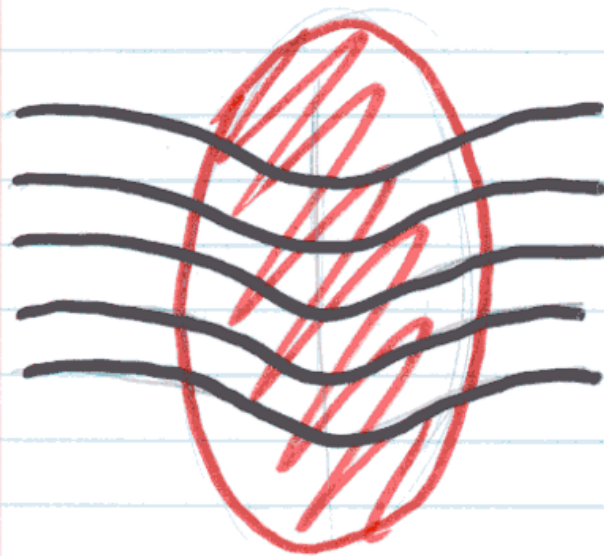
Warm/Cold Advection



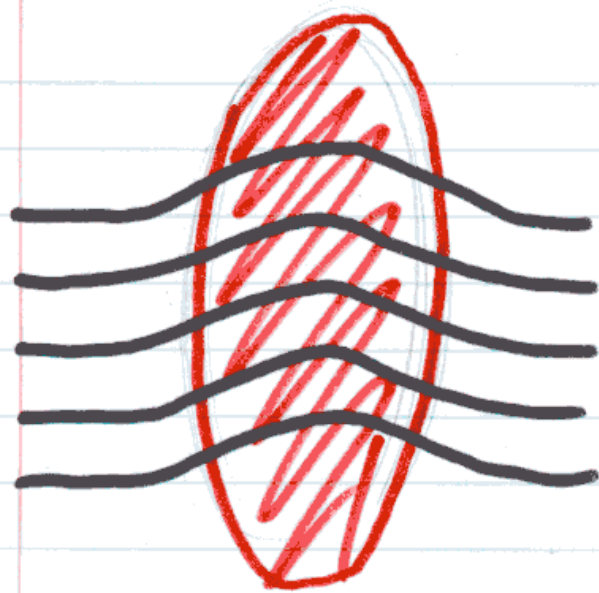
Initial Time



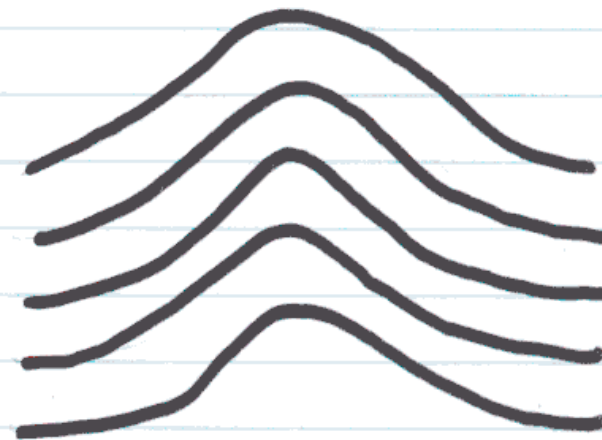
Later Time



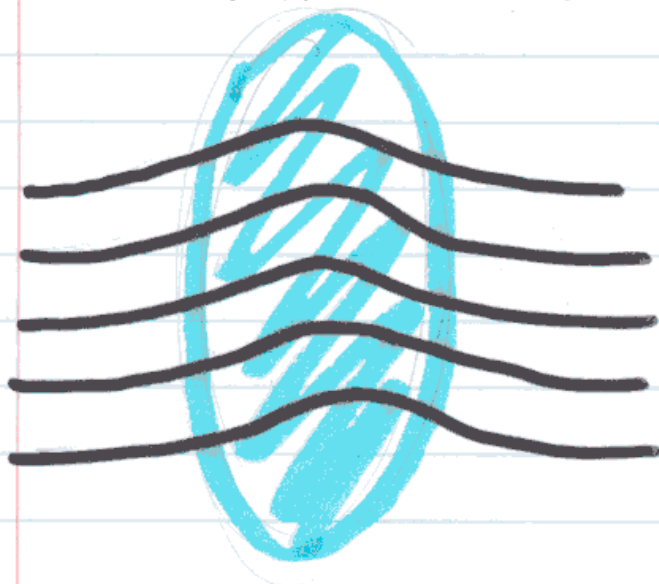
Warm/Cold Advection



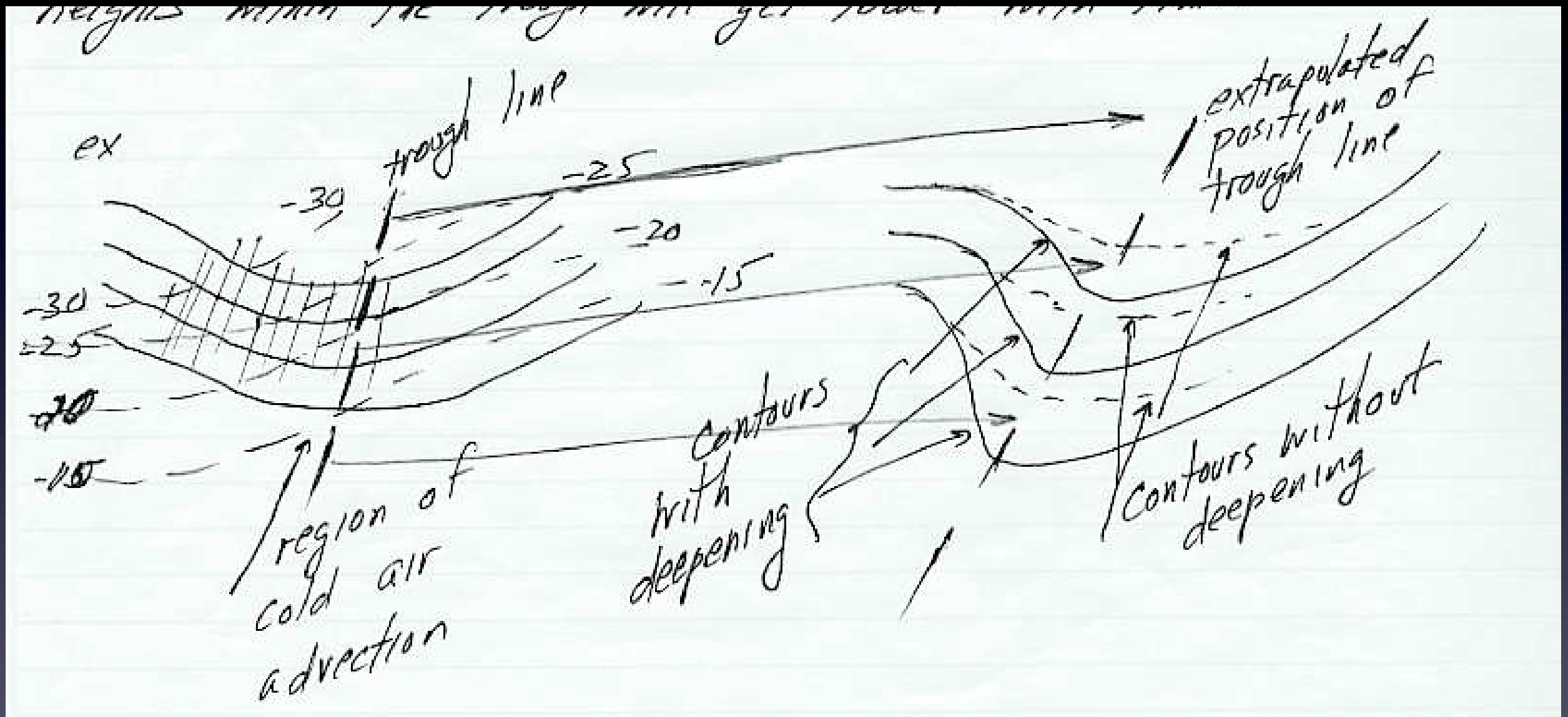
Initial Time



Later Time



Warm/Cold Advection

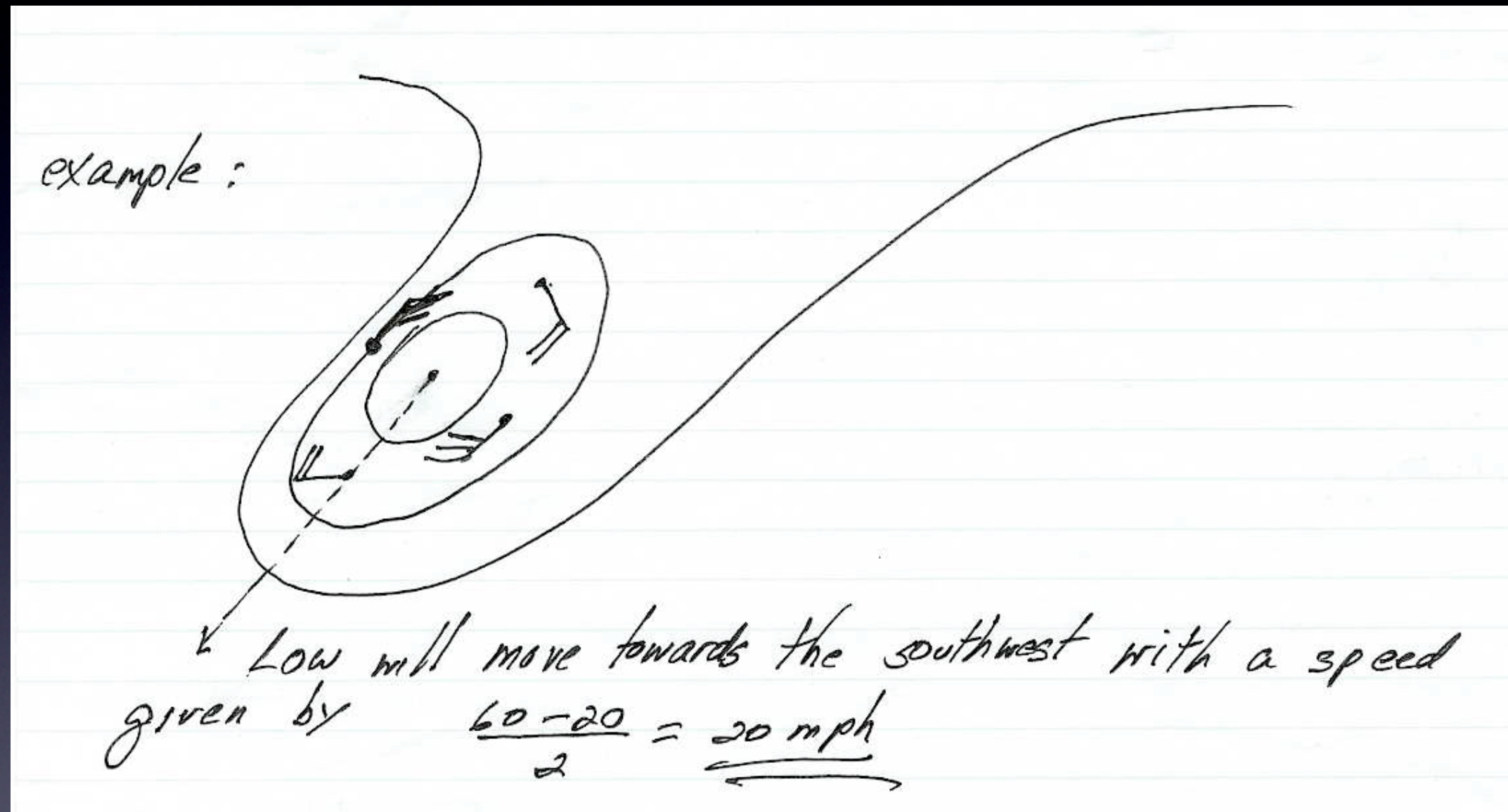


- This Picture = Extrapolation + Cold Advection

Warm/Cold Advection

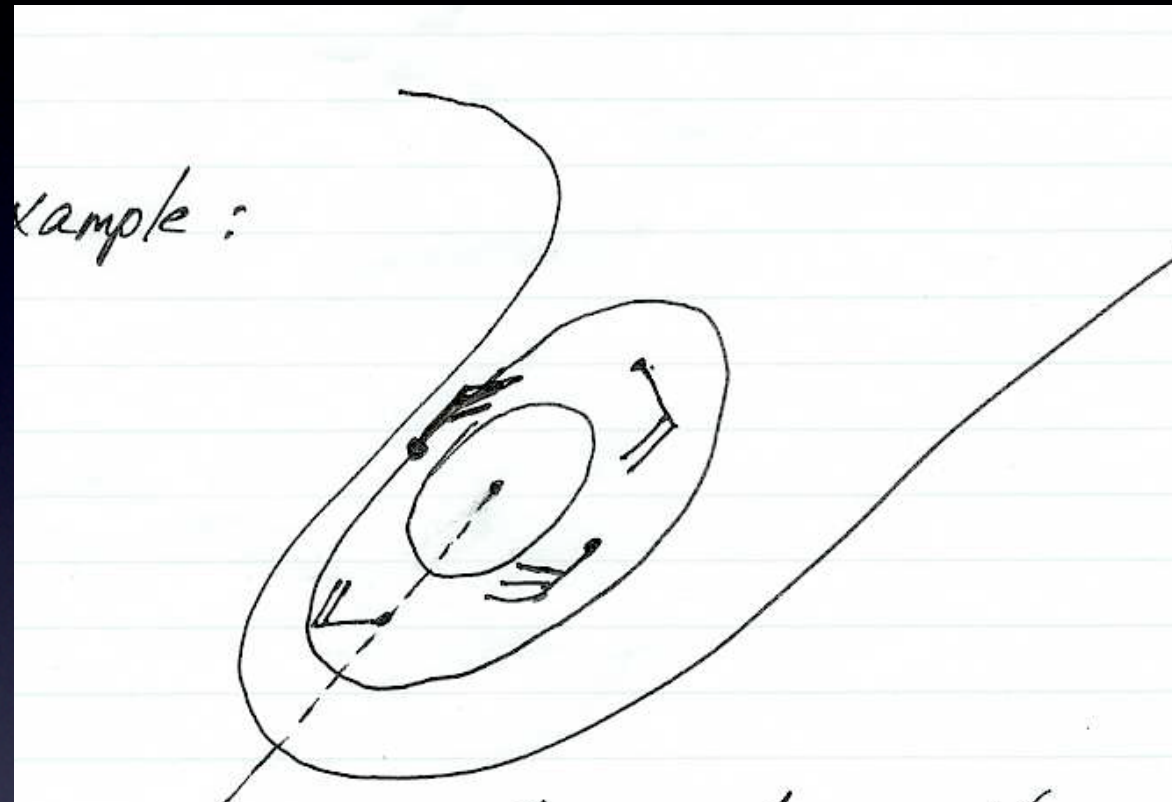
- Warm/cold advection can occur anywhere in the atmosphere
- For this class, we only care about advection in the upper levels (i.e., 500mb) and how it affects height contours
- Advection tells you how the shape of the height contours will change (stronger, weaker, flatter, etc.)

Upper Level Lows



- This Picture = Exactly What It Says
- What the...?

Upper Level Lows

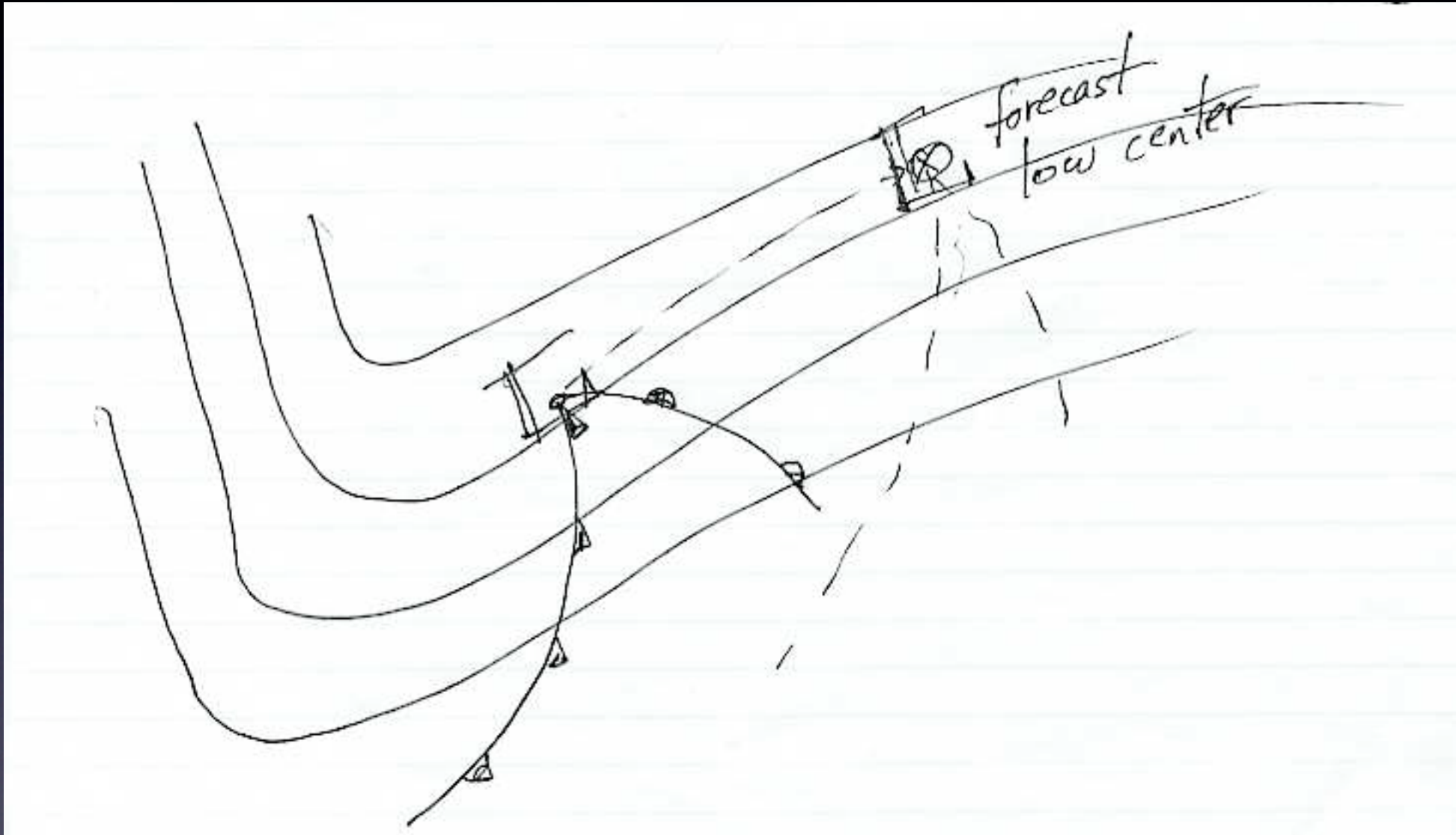


- Ingredients
 - Upper level low (seriously...)
 - Fastest wind and slowest wind on the same contour
 - Approx. the same distance from the low center
 - $(\text{Fastest} - \text{Slowest}) / 2 = \text{How Fast}$
 - Fastest Wind Direction = Where

Upper Level Lows

- “The Wind Rule” works only for closed upper level lows
- Don’t use surface winds
- Don’t use surface lows
- The surface has *nothing* to do with this rule
- “The Wind Rule” tells you where the *low center* will move to in the forecast period

Steering

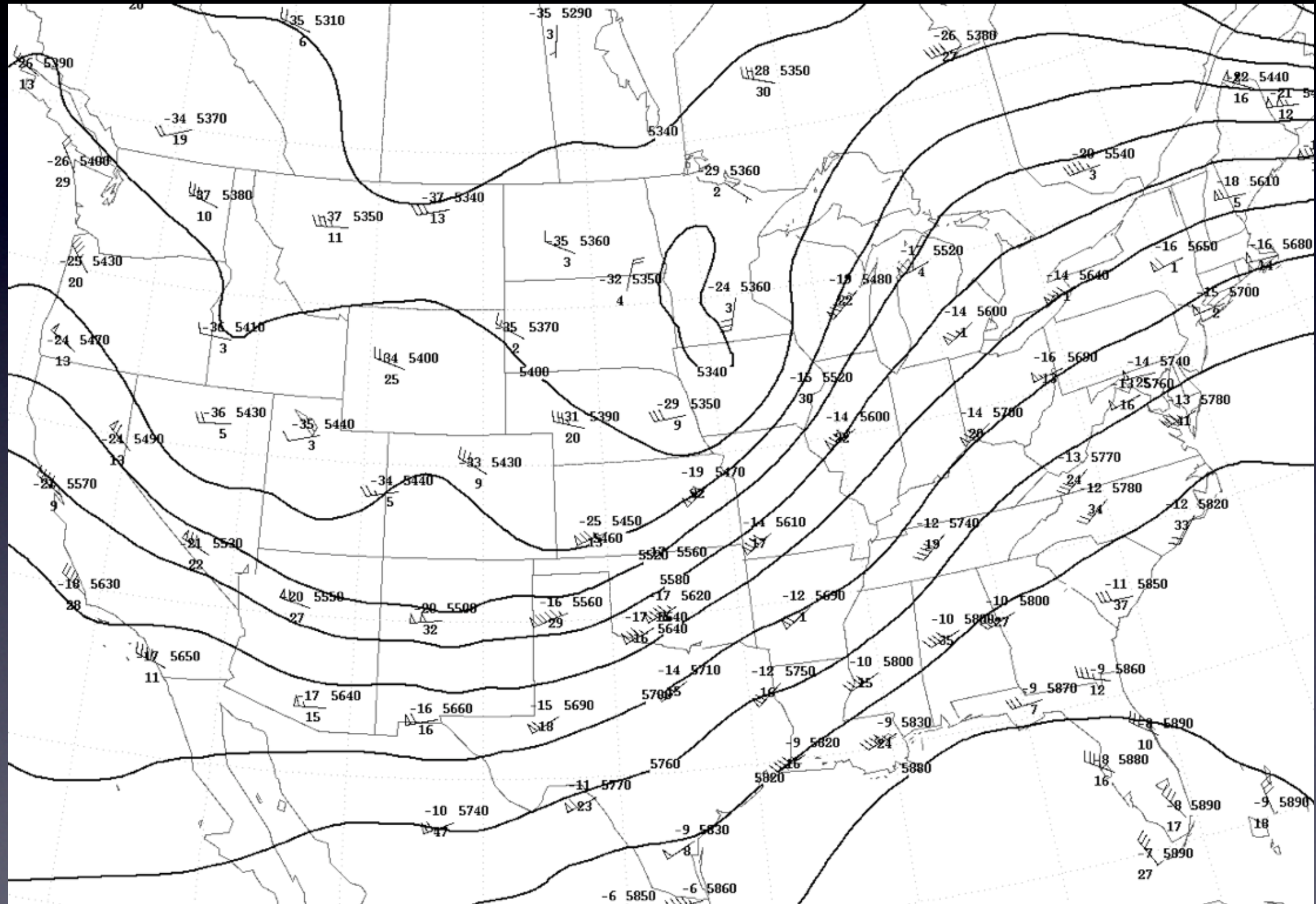


- Most Confusing Rule
- Involves both the surface and the upper levels

Steering

1. To guide by means of a device
 2. To direct the course of
 3. To guide a vessel or vehicle
 4. To follow or move in a set course
- What's going on???
 - Essentially, the upper level flow is directing traffic
 - The wind at 500mb is the “device” that is “guiding” surface features “in a set course”
 - The “set course” is the 500mb height pattern

Steering



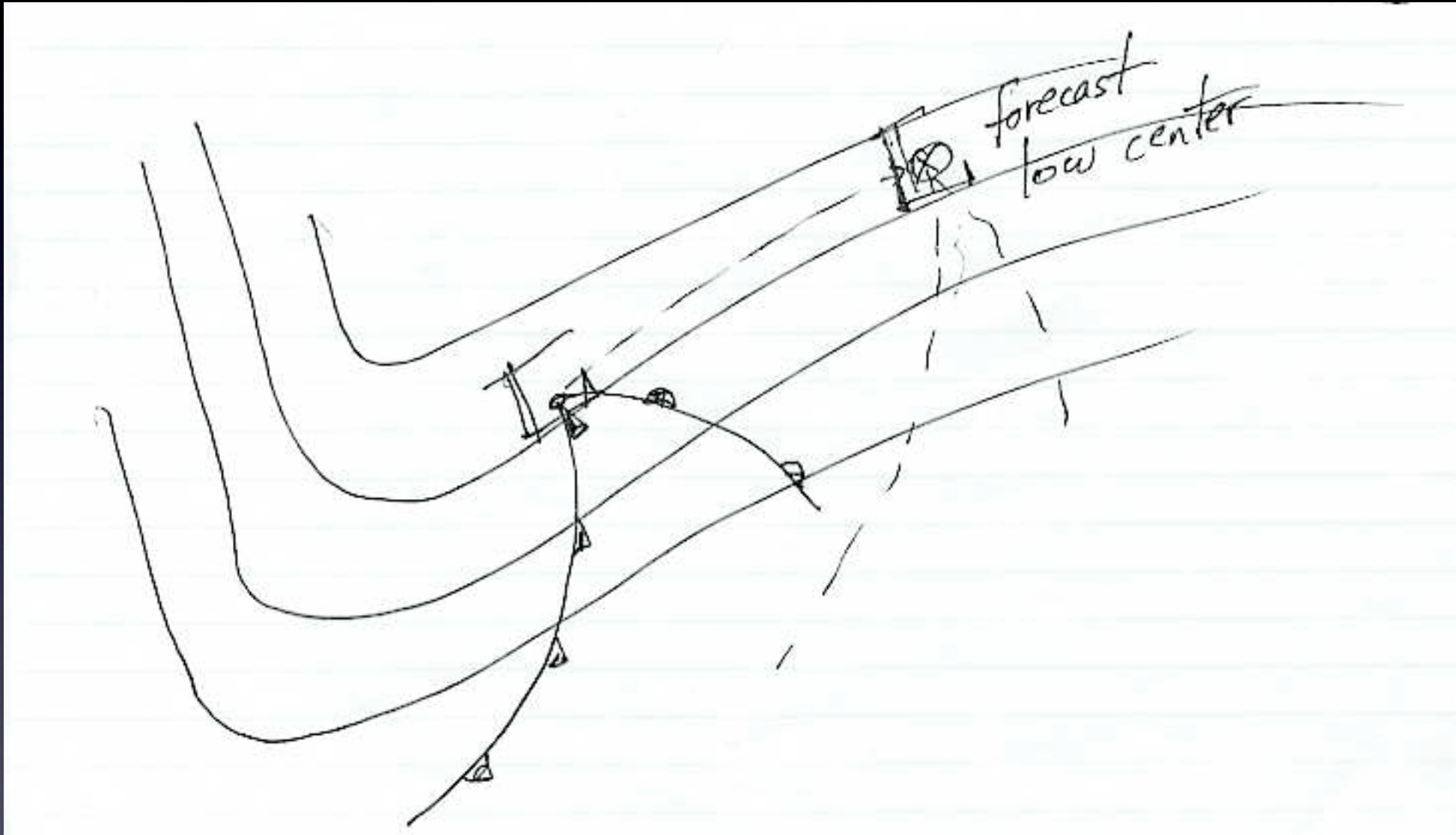
Steering

- Near the ground, there's a lot to impede airflow
 - Mountains
 - Buildings
 - UA Football Team
- There is friction near the ground, so the wind should be slower
- There isn't friction 15,000+ ft. above the ground, so the wind should be faster
- So we need to slow down the winds above us in order to steer properly
- We are accounting for friction near the ground

Steering

- Most surface features move at half (50%) the upper level windspeed
- Notable Exception: Warm Fronts, they move at one quarter (25%) of the upper level windspeed
- All features move parallel to/along the upper level flow (i.e., height contours)
- Procedure
 1. Transcribe surface feature onto 500mb map (draw a dot)
 2. Determine a windspeed for that feature (guesstimate)
 3. Divide by 2 (or 4) = How Fast
 4. Along The Height Contours = Where

Steering



- Remember: You are moving something on the ground
- 500mb map only tells you where and how fast