

### **GOALS**

1) Construct a scientifically reasoned forecast from limited basic data.

2) Develop a reproducible forecast process.

### How do we do this?

Using concepts such as:

- QG reasoning
- PV reasoning
- Jet Streak Dynamics
  - etc...

# Keep in mind pt 1...

Right now we're focusing on the evolution of synoptic scale features associated with severe weather events.

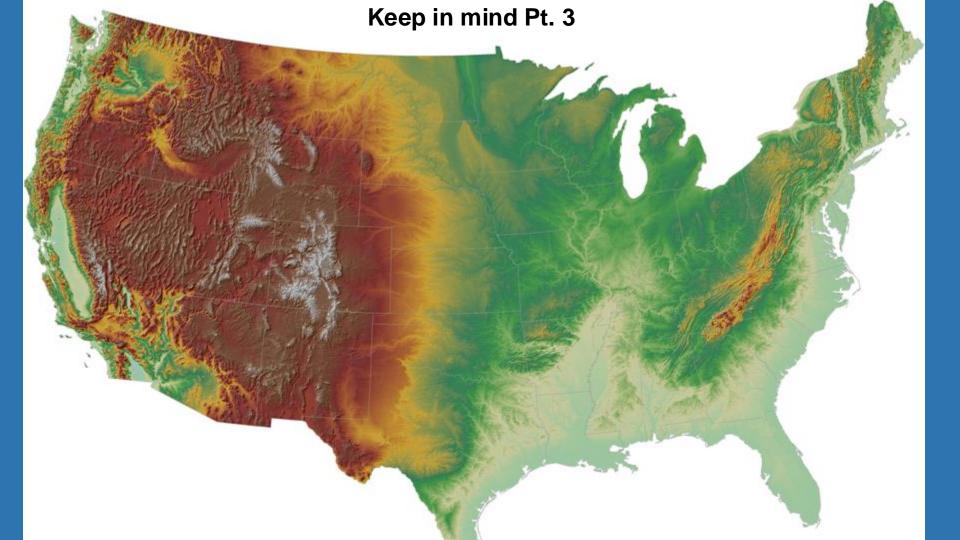
Details regarding the thunderstorm environments, mesoscale and storm-scale influences will be covered later.

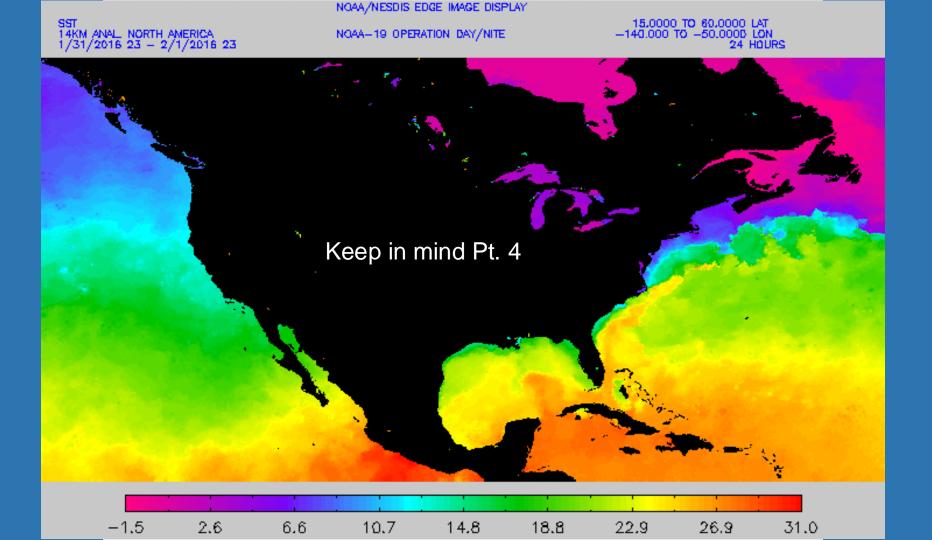
## Keep in mind pt 2...

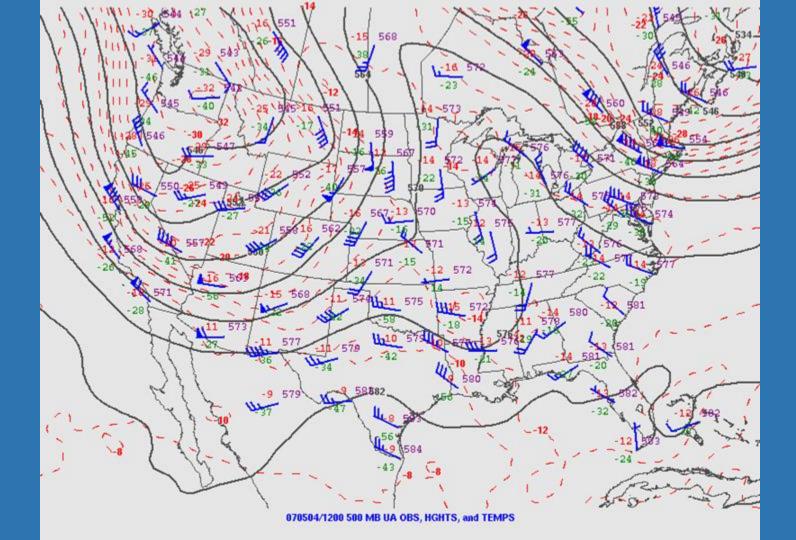
There are several different forcing mechanisms for ascent/descent in the atmosphere.

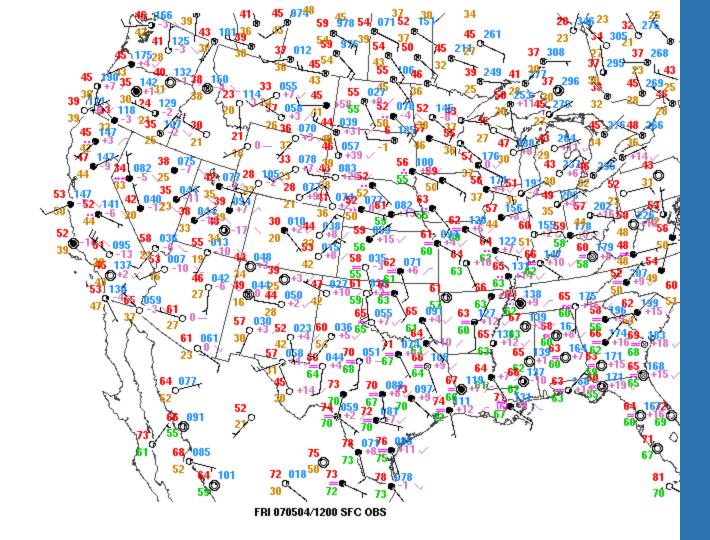
Be sure to consider:

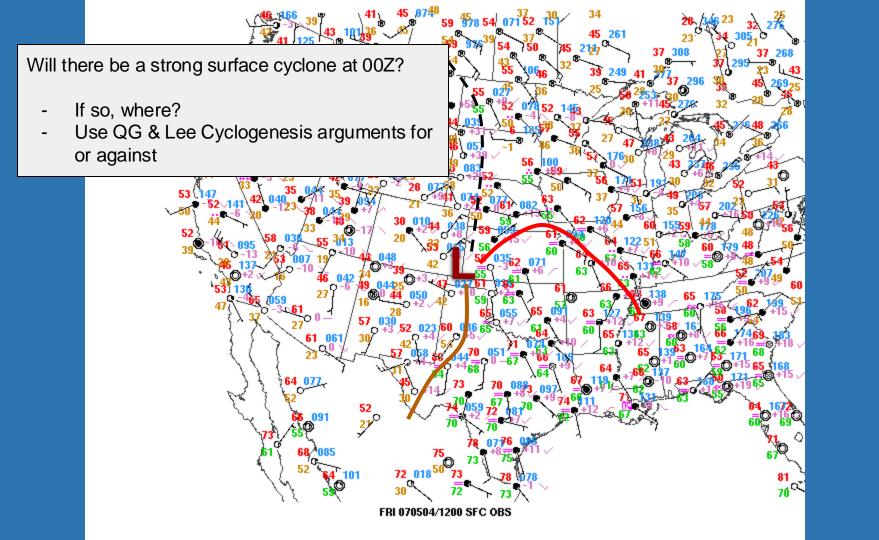
- Which mechanisms are the strongest?
- Where is there overlap of multiple mechanisms?
  - What influence will these mechanisms have?

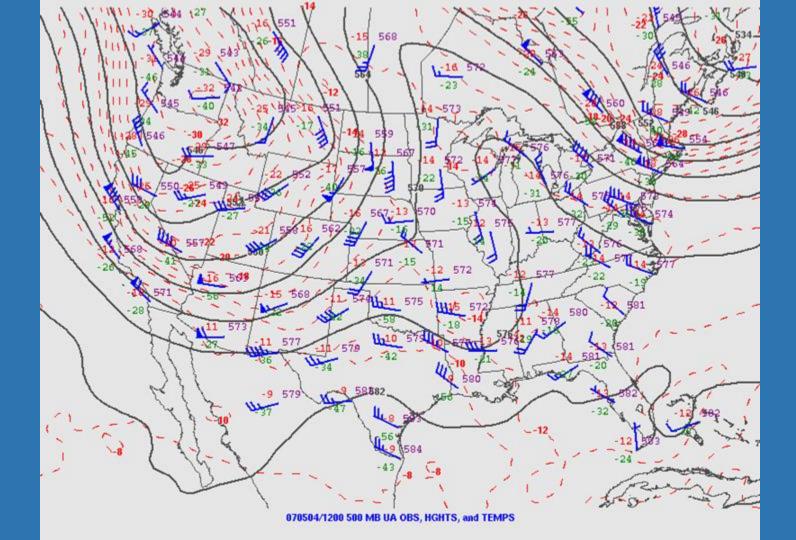


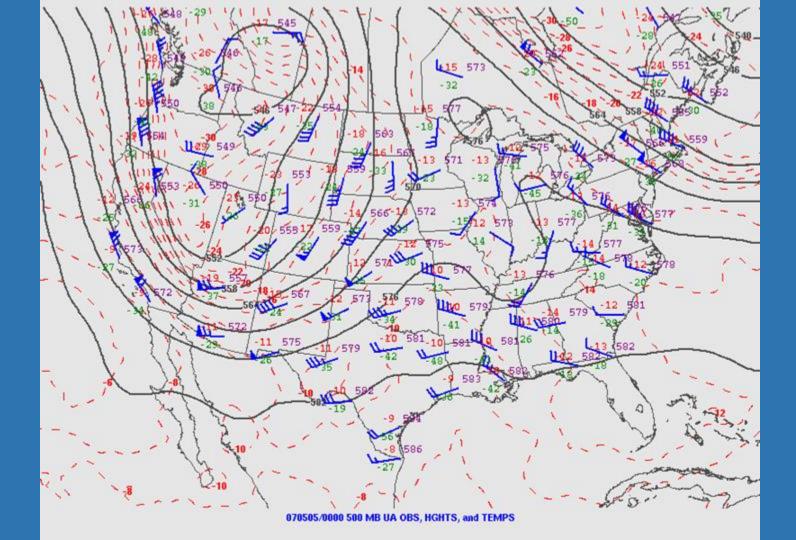


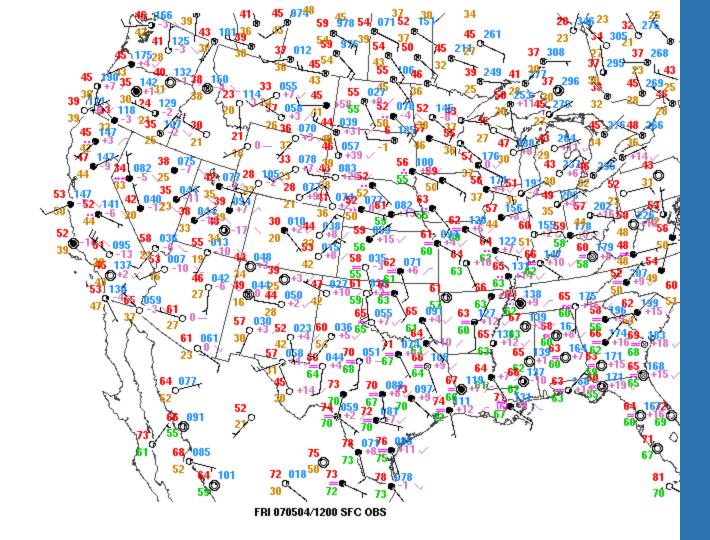


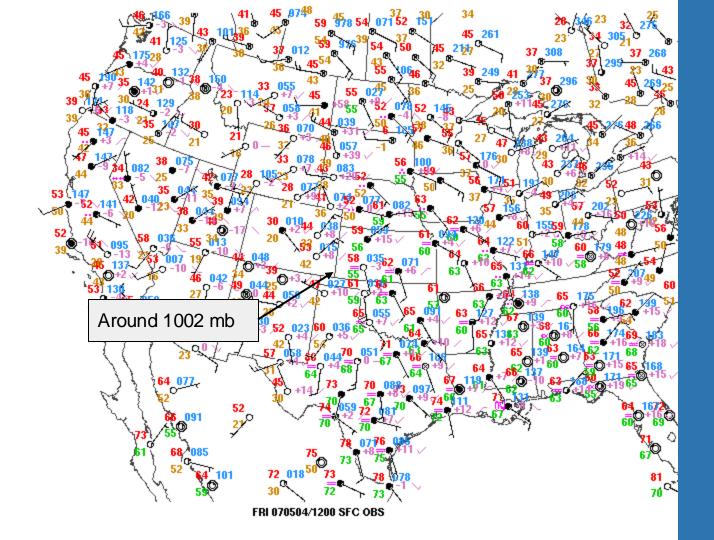


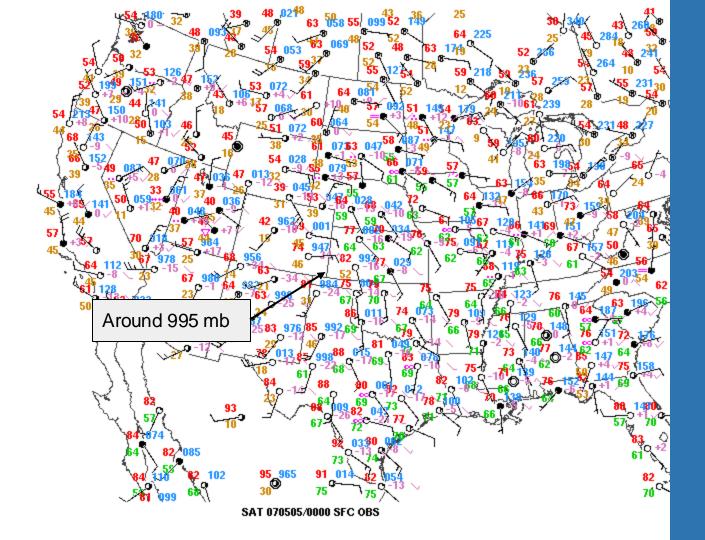




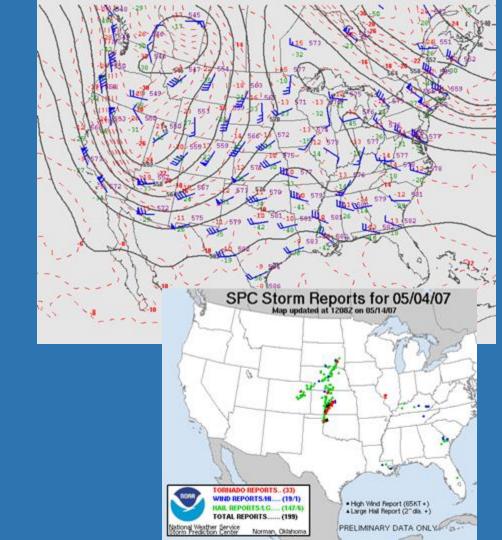


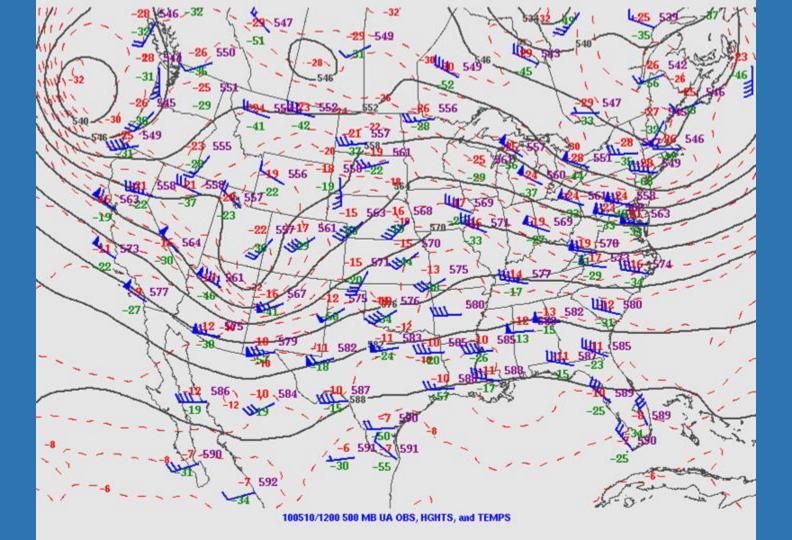


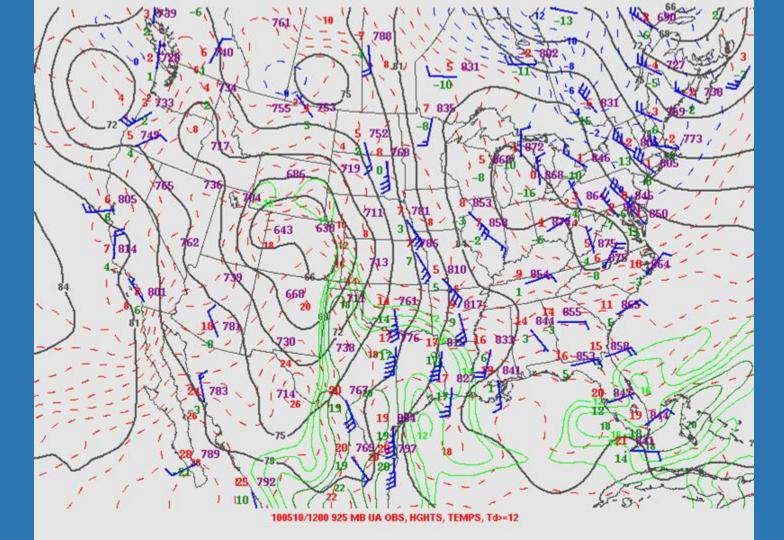




- Mid-level shortwave trough west/northwest of the Four Corners (stronger QG influences west of the Plains)
- Strongest mid-level flow over and across the higher terrain of NM (vs. weaker and more parallel flow along the terrain to the north).
- Result = deepening lee cyclone in southeast CO region.





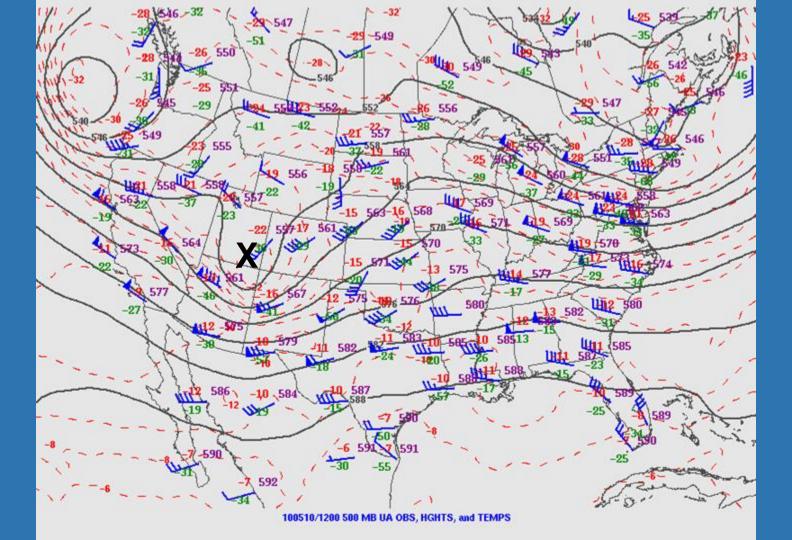


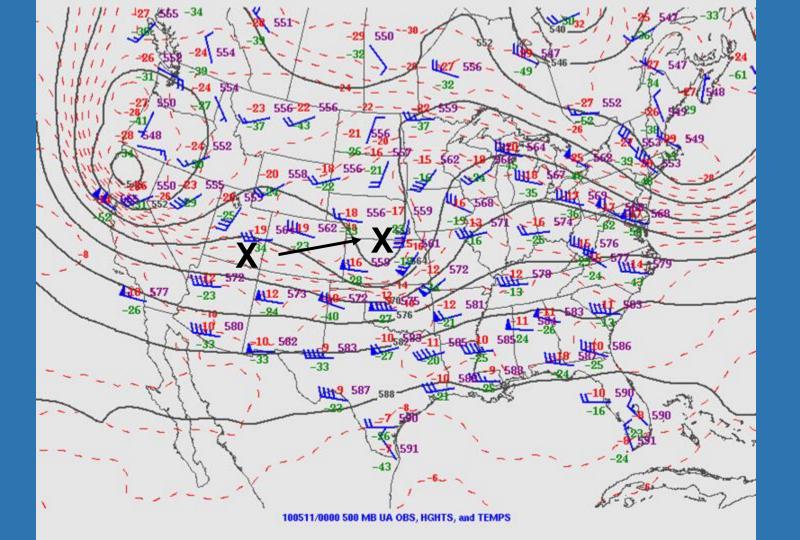
# Forecast the 925 mb cyclone at 00 Z

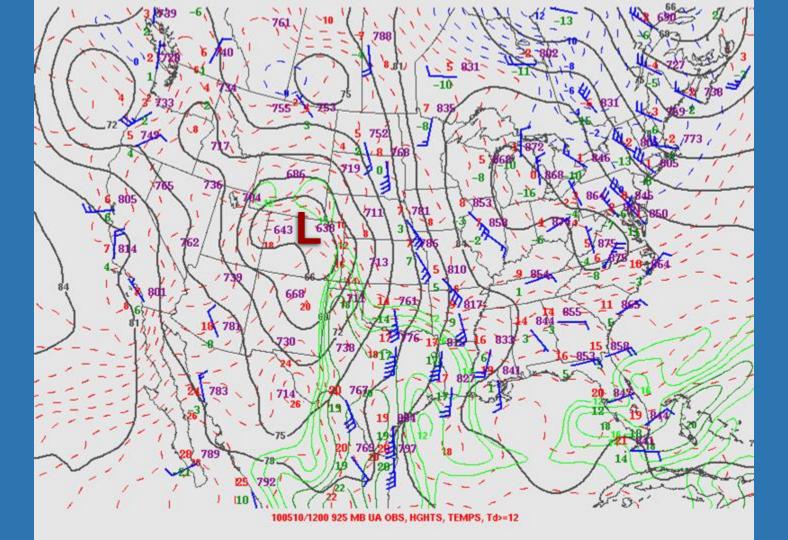
Where will it be located?

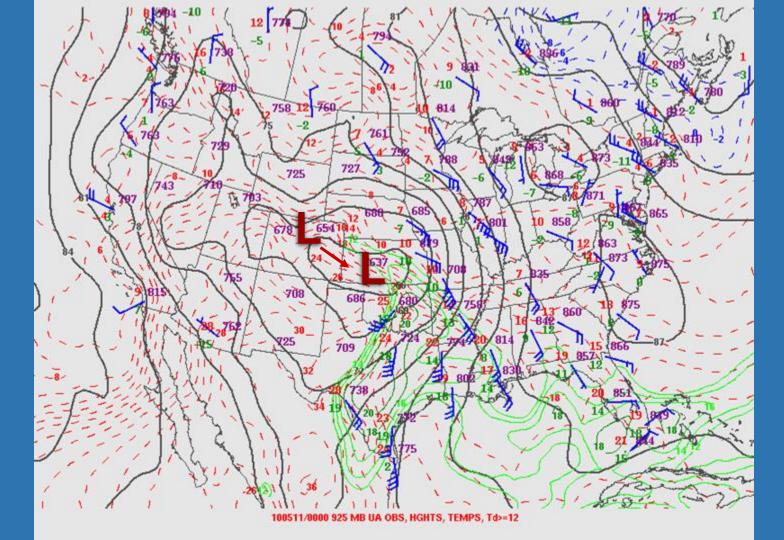
Will it deepen?

Use QG arguments to support your answer!

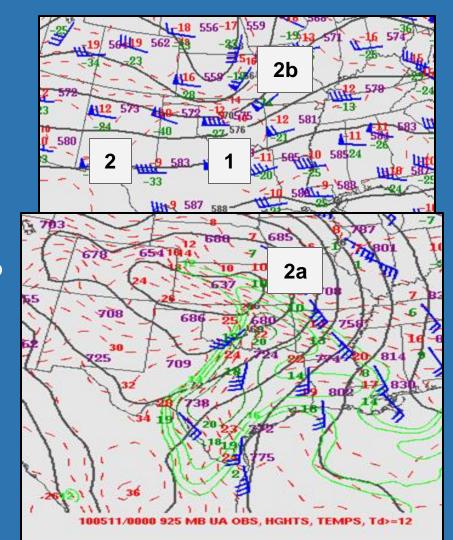






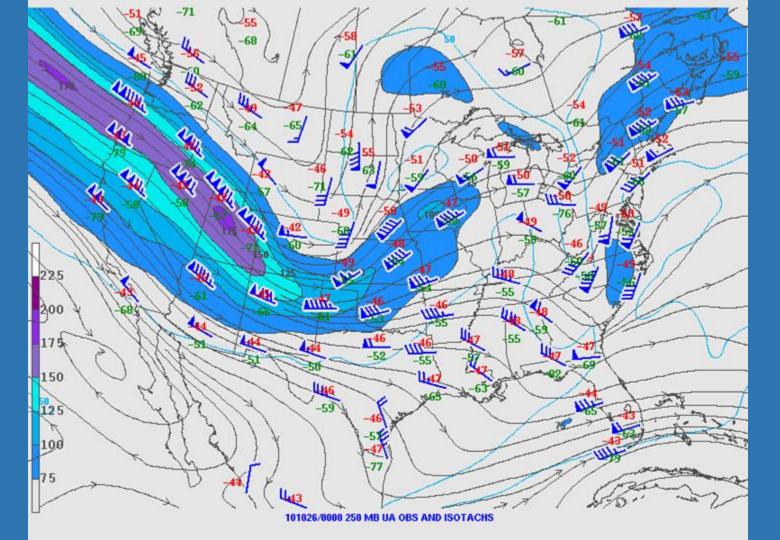


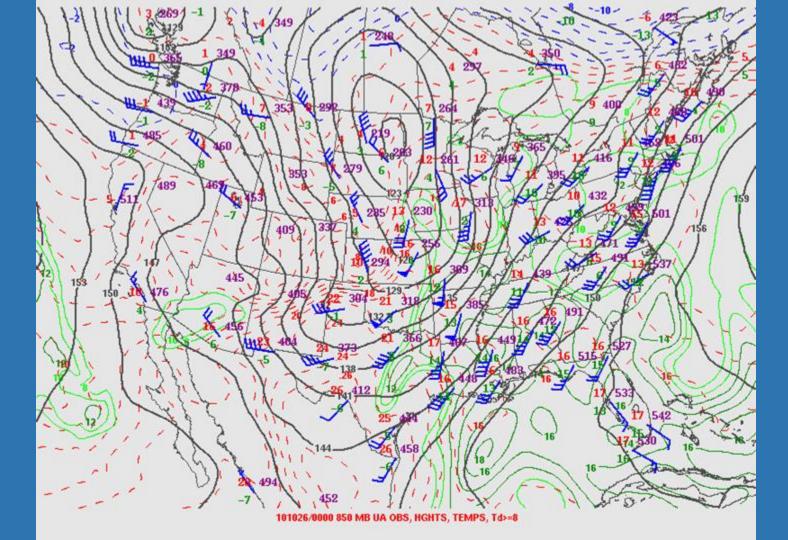
- 1) Strongest mid-level flow is moving over the higher terrain in the morning, but is exiting by the afternoon.
- 2) Lee cyclogenesis/troughing continues (due to persistent zonal flow over the S. Rockies), but becomes secondary to:
  - 2a) Low-level warm advection over OK
  - 2b) Inferred DCVA over KS/OK
- Net result = non-deepening low that shifts east/southeast.



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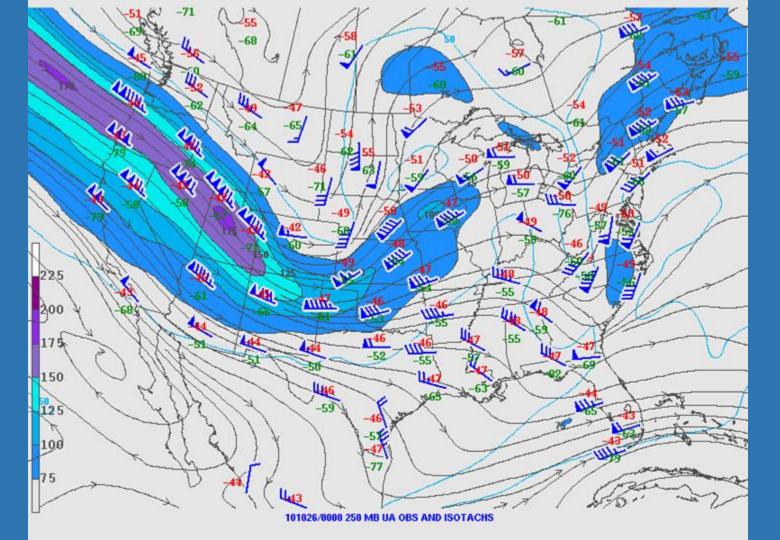


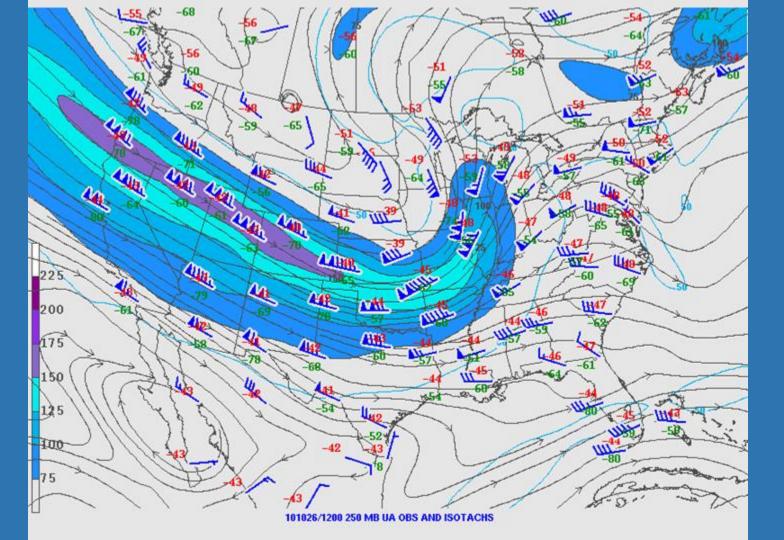
# Forecast the 850 mb cyclone at 12 Z

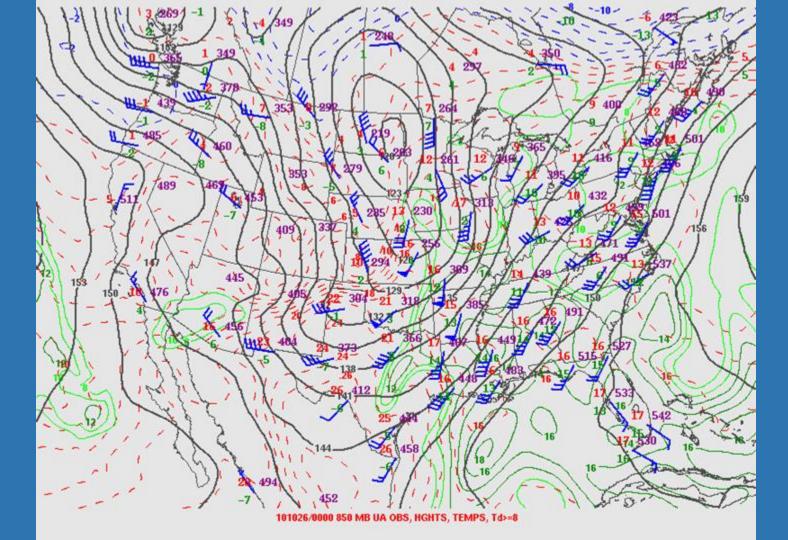
Where will it be located?

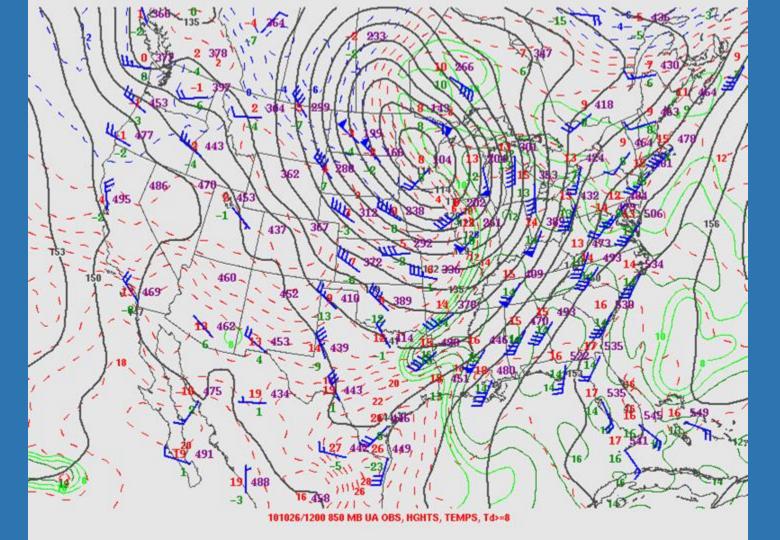
Will it deepen?

Use QG arguments to support your answer!

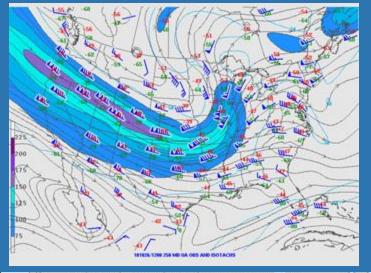




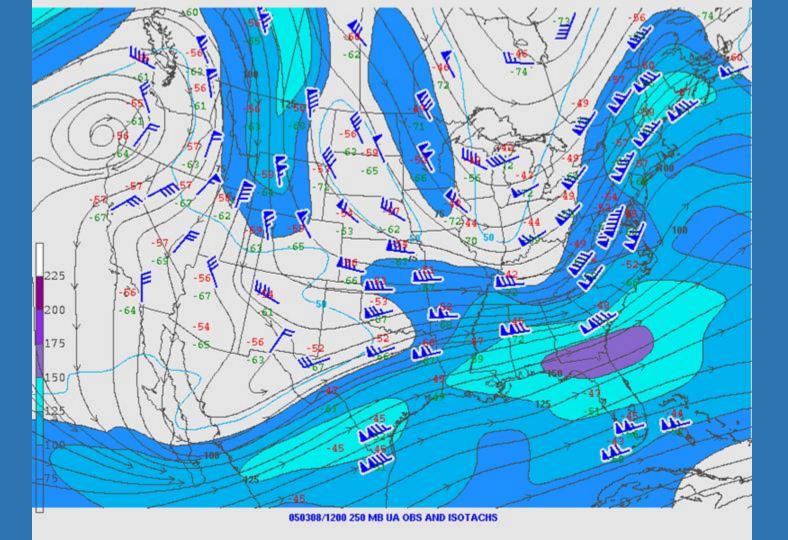


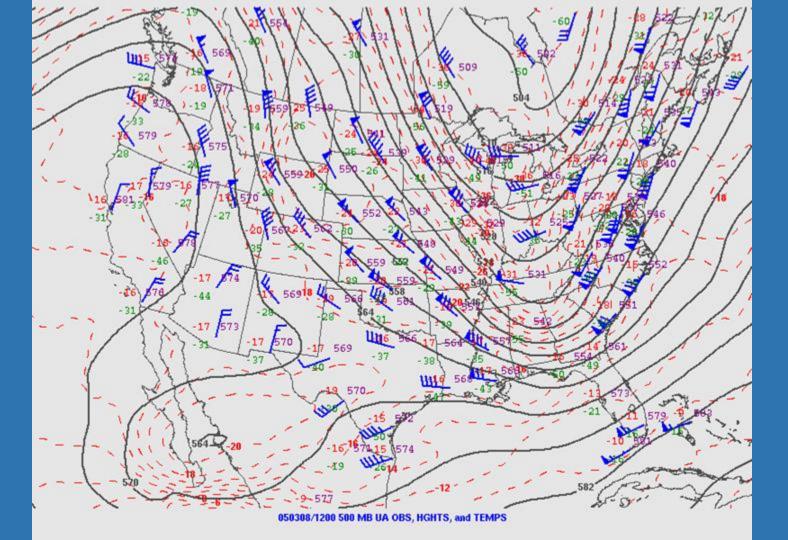


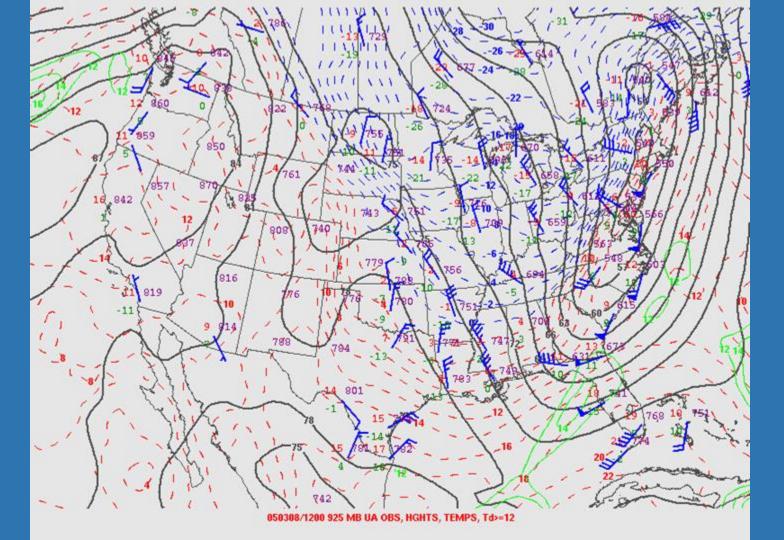
- Began with large cyclone in the lee of the northern Rockies.
- Intense jet streak aloft moves into the northern Plains.
  - Lift from left exit region.
  - Inferred lift via DCVA
- Result = deepening low over Dakotas/West MN.









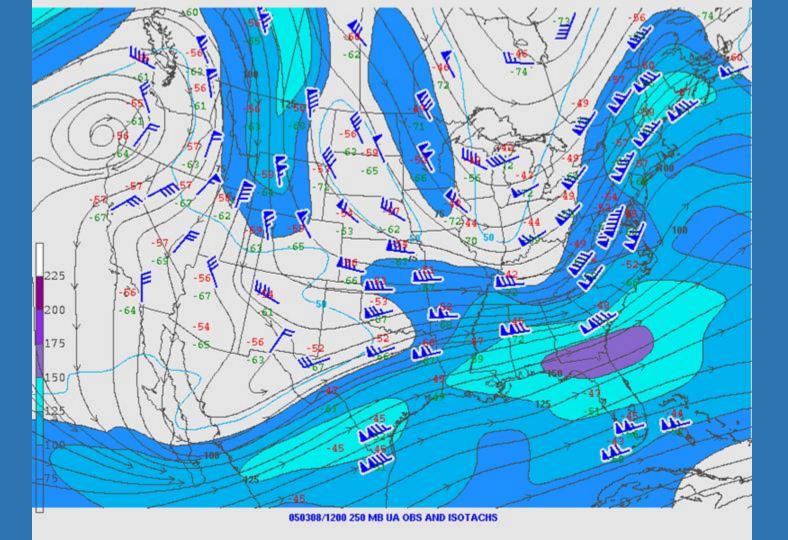


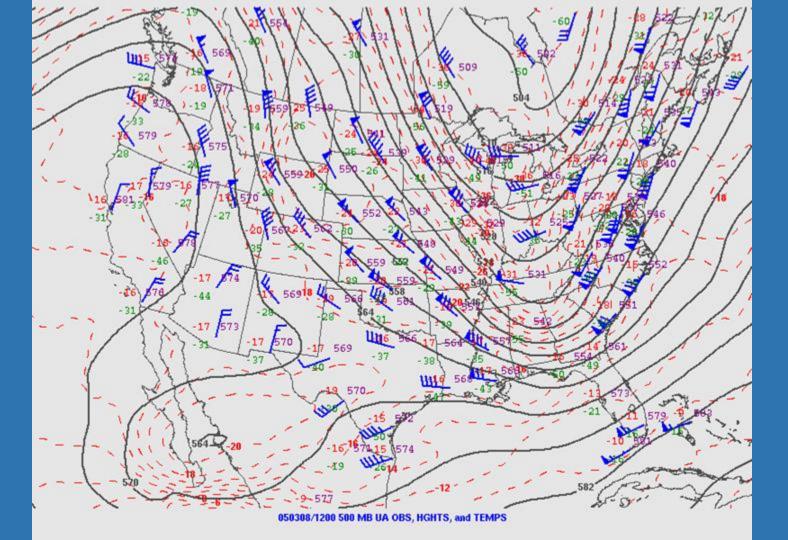
# Forecast the 925 mb cyclone at 00 Z

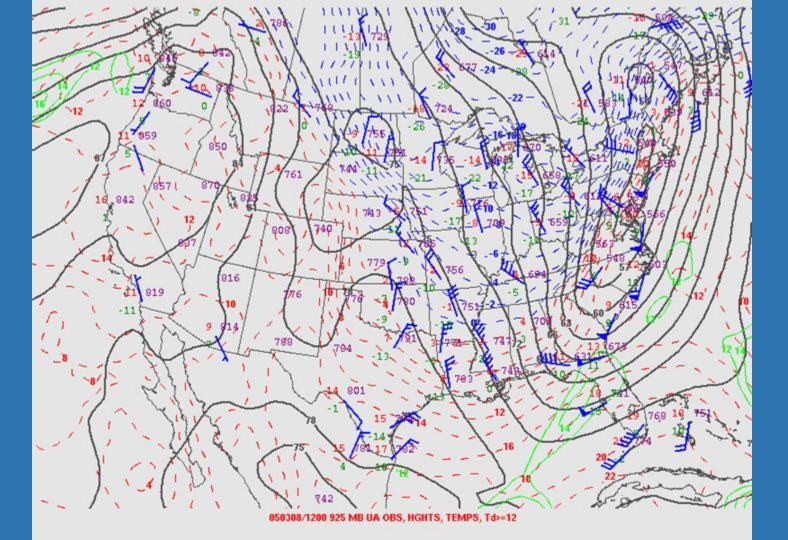
Where will it be located?

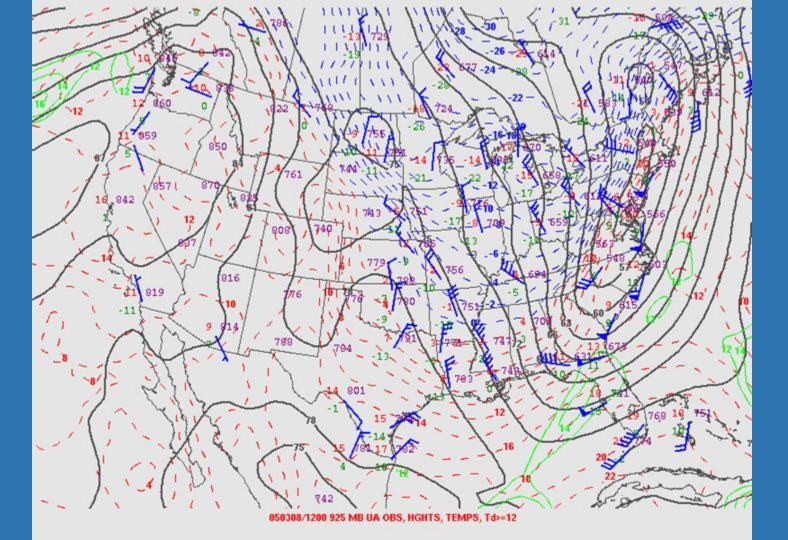
Will it deepen?

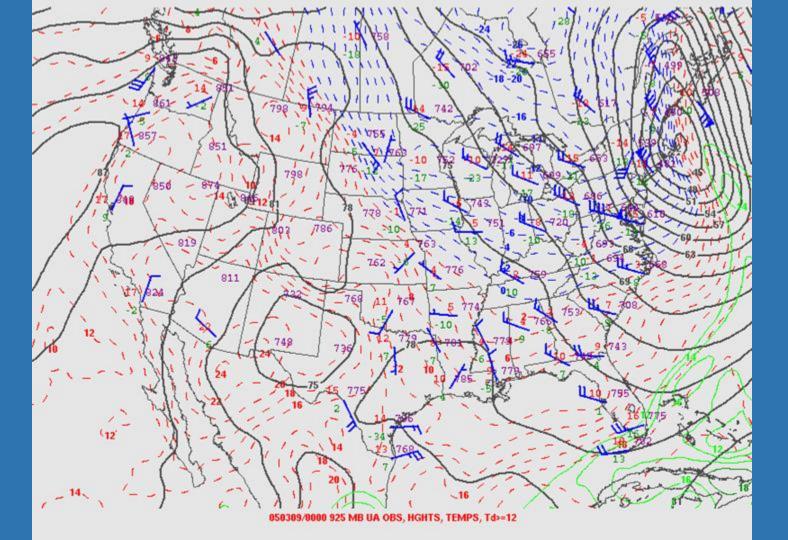
Use QG arguments to support your answer!











#### **Contributing Factors**

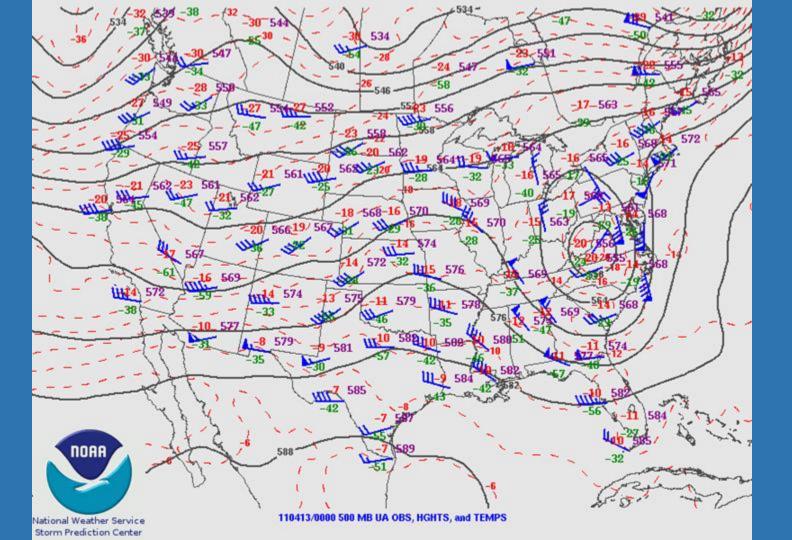
- Coupled upper-level jet structure.
- Inferred lift from DCVA ahead of the approaching shortwave trough.
- Strong low-level warm air advection across Maine.
- Warm ocean waters from the Gulf Stream allow for reduced low-level static
   stability/steepening low-level lapse rates, which allow for easier/efficient deepening of the low.

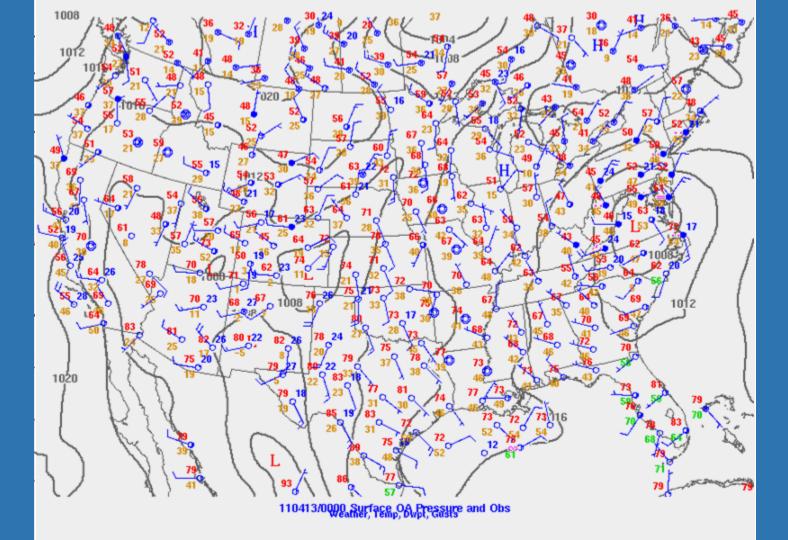
#### **Deducing Surface Flow Patterns**

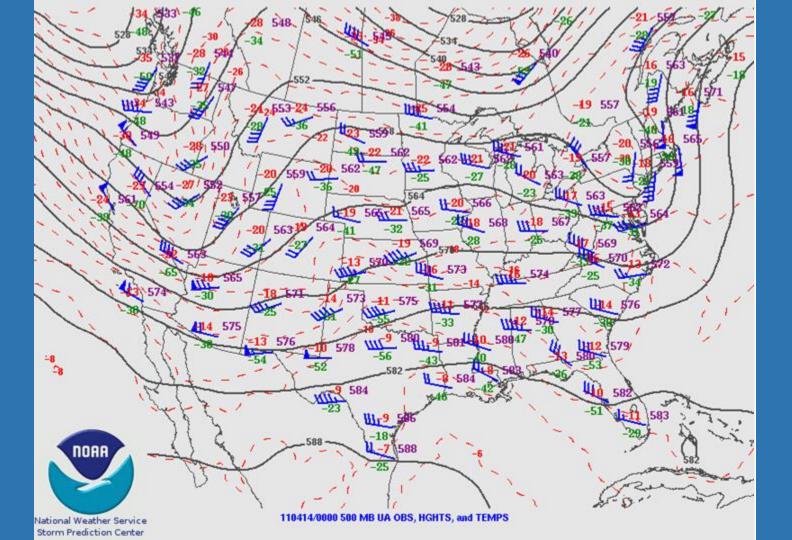
We'll see the progression of the pattern over several days.

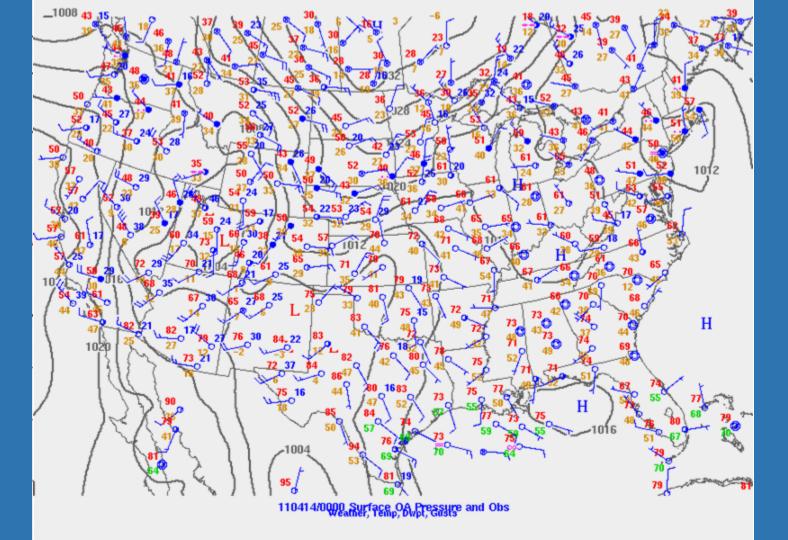
Given a single 500 mb chart, try to anticipate:

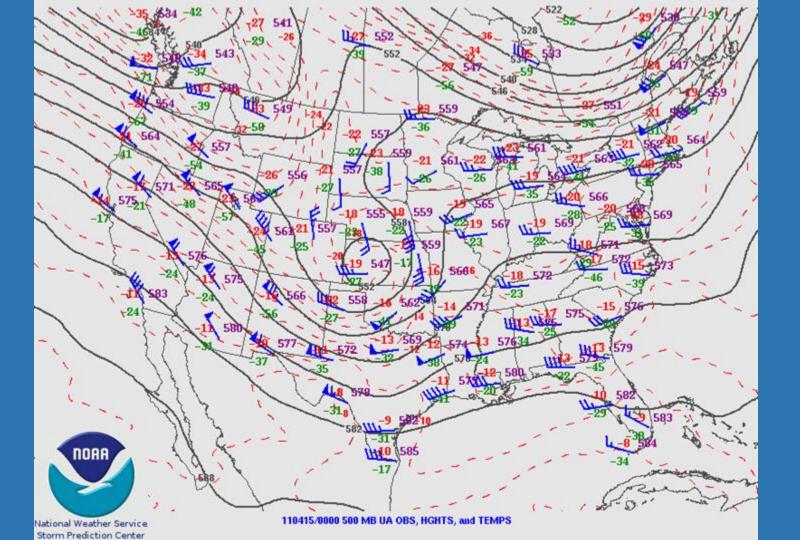
- 1) The expected surface pressure pattern
- 2) The resulting low-level moisture return pattern from the Gulf of Mexico into the southern Plains

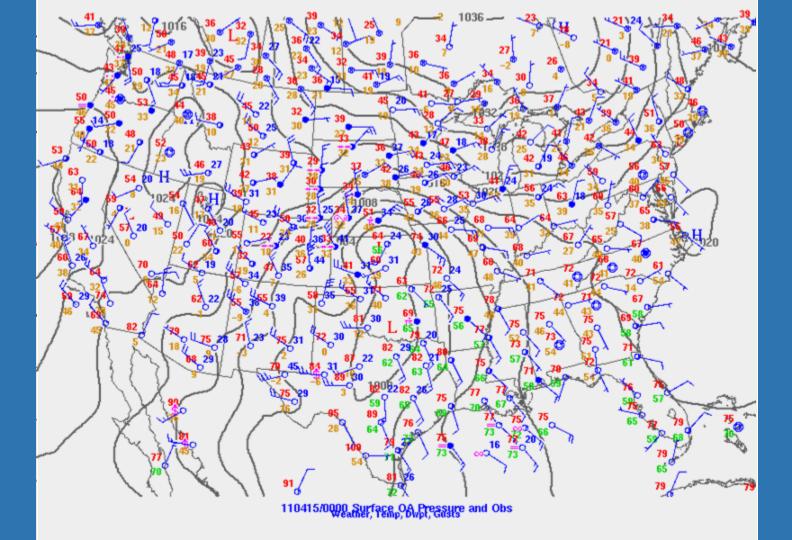








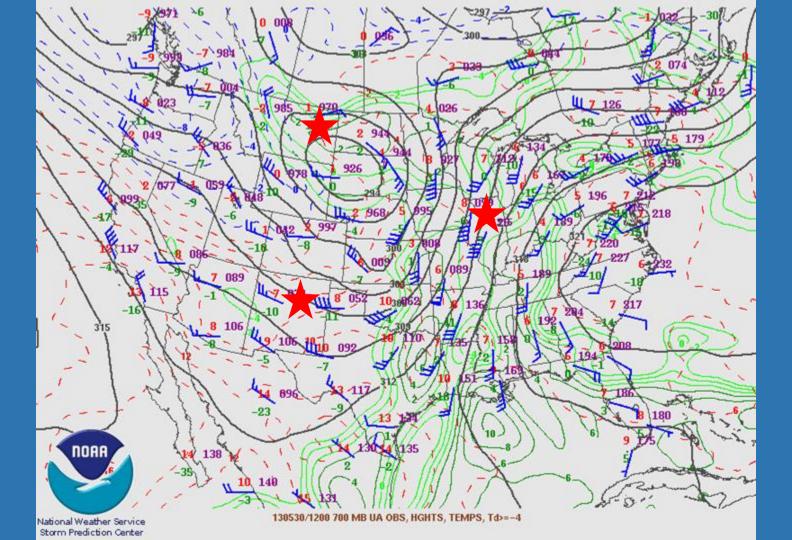


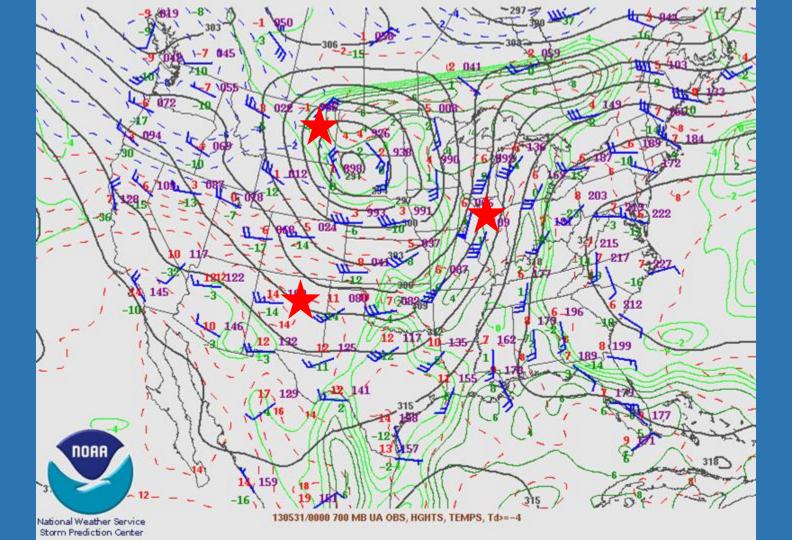


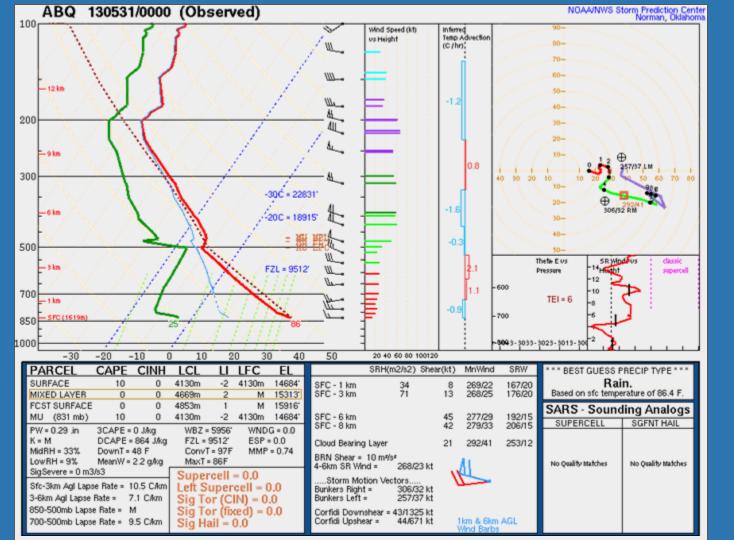
## **Deducing Lapse Rates**

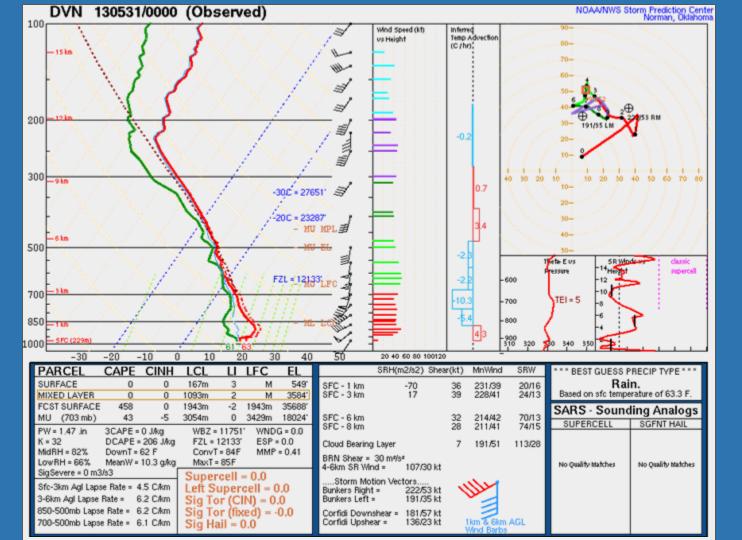
Given: 12 Z and 00 Z 700 mb charts

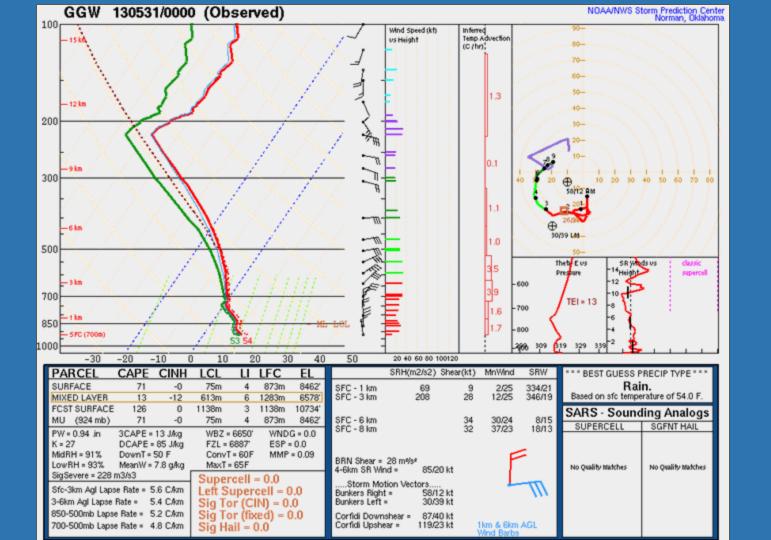
Predict:
Which location will see the steepest 700-500 mb lapse rates?







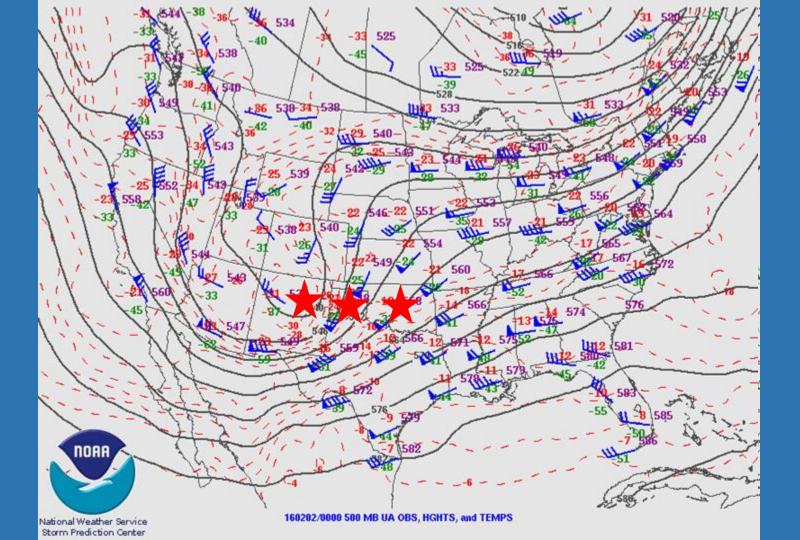


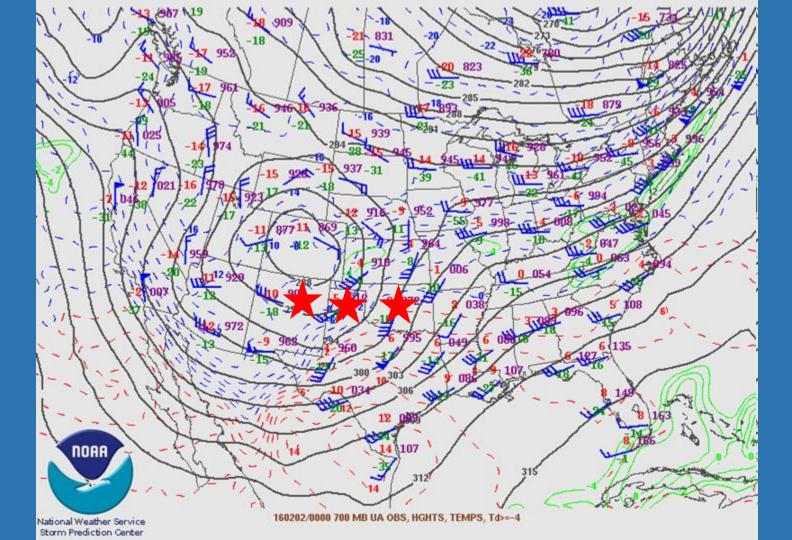


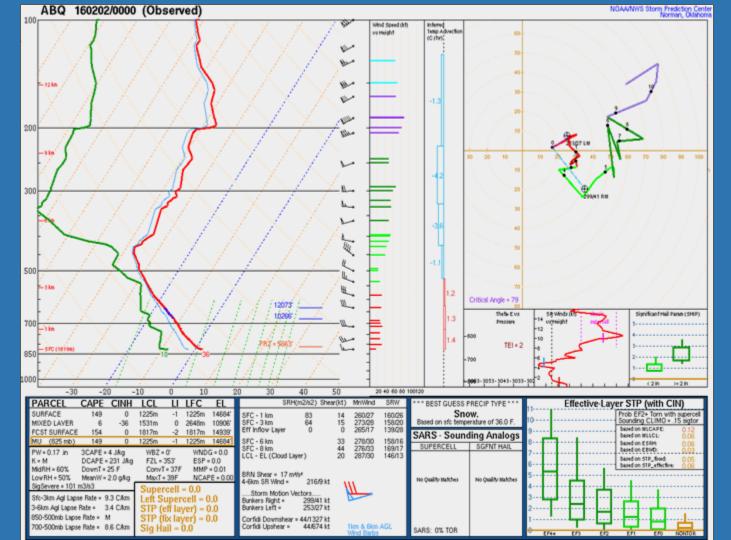
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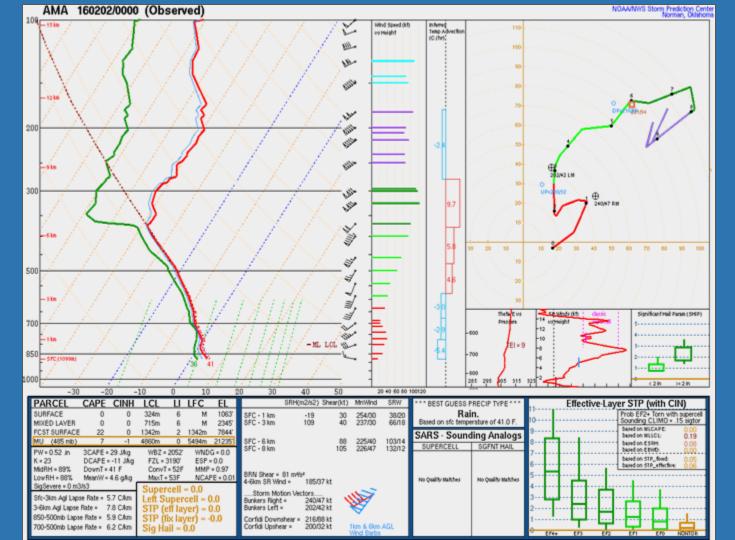
Given: 00Z 700 mb and 500 mb charts

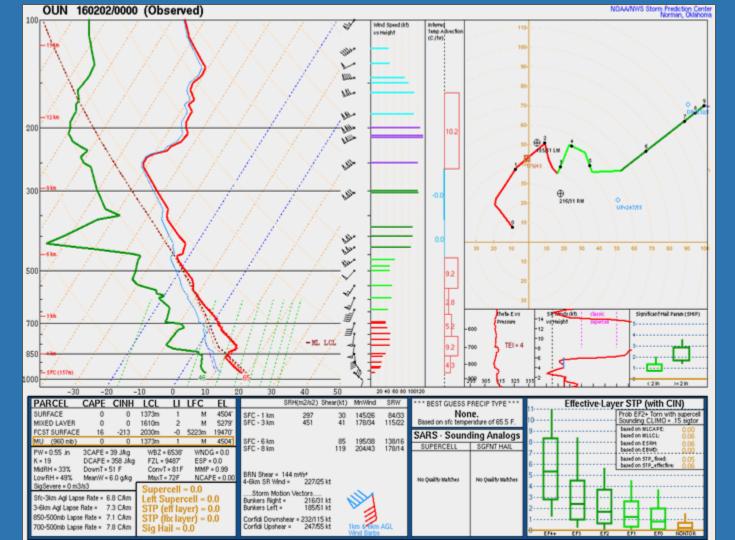
Predict:
Which location will see the steepest 700-500 mb lapse rates?











#### Congrats, you're done!

#### Key Takeaways:

- Even with limited data, you can use synoptic concepts to create a forecast.
  - These analytical skills aid in interpreting model output.
- Always think about what you can observe and infer before jumping to conclusions!

Finally: Practice! Practice! Practice!