

IC5.4: Optional Job Sheet Answer Key

Examples of Frontal Precipitation Bands

Question 1. Where is the Q-vector convergence strongest at the 12 hr forecast valid 12 UTC on 24 November?

Southern Missouri has a large area of strong Q-vector convergence.

Question 2. Step forward 6 hrs to the 18 UTC forecast. At this time where is the upper level Q-vector convergence strongest?

Strong Q-vector convergence moved almost due east and is over central Illinois.

Question 3. Where is the low to mid level forcing due to frontogenesis strongest at the forecast valid at 12 UTC? How about the forecast 18 UTC on 24 November?

850 mb 12UTC: Intense frontogenesis across central Missouri, central Illinois, and western Indiana. At 18 UTC it shifts east to western Illinois and central Indiana. At 700 mb the frontogenesis is even strong and displaced north of the 850 mb locations at both 12 UTC and 18 UTC.

Question 4. Is the low- to mid-level forcing collocated with the upper tropospheric forcing at 12 UTC and/or 18 UTC? (Circle the appropriate one(s))

12 UTC 24 November Forecast: **YES**

18 UTC 24 November Forecast: **YES**

Question 5. Do you expect any convection across Illinois, either via conditional instability or slantwise instability?

There is high enough RH such that MPVg should be valid. There is a fair amount of instability present across Illinois at 18 UTC.

Question 6. Describe all the different forcing mechanisms that may be in play to result in the > 20 $\mu\text{b}/\text{sec}$ rising motion over central Illinois.

Warning Decision Training Branch

Three primary things are progged to come together across central Illinois:

1. Extreme low level frontogenesis
2. Extreme positive vorticity advection increasing with height, and through QG theory should lead to significant rising motion
3. Moderate instability just above the frontal surface allows for mesoscale precipitation banding to develop