## ATM 400: Synoptic Meteorology I Homework Assignment #1: Fun with vectors, derivatives, and jets! Due: Wednesday, September 4

- Please use the 2205 UTC 8 May 2003 surface analysis (below) from the Oklahoma Mesonet (<u>https://www.mesonet.orgl</u>) to answer the following questions:
  - **a.** What is the dew point gradient between Beaver and Pauls Valley? Circle these two stations on the map and draw an arrow in the direction of the gradient.
  - **b.** Given the gradient you found in (a) and the plotted winds, what kind of dew point advection would you expect in Weatherford? Explain your answer both mathematically and physically.
  - **c.** Using the gradient you found in (a), what would be the magnitude of the dew point advection in Minco?



- 2. Suppose a zonally-oriented *easterly* jet streak is present in the Northern Hemisphere.
  - **a.** Assuming  $\vec{V}_{g iet} \gg \vec{V}_{g sfc}$ , in what direction is the mean temperature gradient?
  - **b.** Explain how the ageostrophic circulation in the jet exit region acts to restore thermal wind balance. Be sure to consider both the horizontal and vertical branches of the circulation.