IC5.5: Optional Job Sheet Answer Key

The Structure of TROWALS

Question 1. Is there a surface occluded front? YES/NO (Circle one) If so, where is it located?

No concrete evidence of a surface occluded front.

Question 2. Is there evidence of a TROWAL in this image?

Question one was sort of a set-up for this question. This case is far from a typical TROWAL event. Using the potential temperature plotted on a constant surface map is not the best way to look for TROWALS as learned in the training module, and this case is certainly a tough one. At any one pressure level there isn't much evidence of a thermal ridge. At 700 mb, there is evidence of a thermal ridge across central Nebraska, but it is just about perfectly positioned above the surface cyclone, not typical of most TROWALS. In any case, this is a difficult case and TROWAL identification is difficult at best using this method.

Question 3. Where is the trowel in this image?

TROWAL Location: Northern Kansas, central Nebraska wrapping into Minnesota

Question 4. How are the placement and/or structure of the TROWAL different from what you saw with the constant pressure plot?

TROWAL structure is much better defined using this method, which is to be expected. Placement of the TROWAL is about the same as with the constant pressure plots.

Question 5. Where within the TROWAL is the strongest upward forcing signal, and qualitatively how strong is it?

Across central Minnesota the upward forcing is fairly strong, but across south-central Nebraska the upward forcing is not impressive.

Question 6. Is there any instability present in the TROWAL? If so, where?

Not any well-defined areas of instability in the TROWAL

Question 7. Explain what the TROWAL looks like in the cross section. Mention if the temperature gradient is larger on one side or the other.

There is a trough indicated in the theta-e lines. The theta-e gradient is strongest to the southeast of the TROWAL axis, closest to the potential vorticity minimum in mid-levels. Elevated frontogenesis exists from about 550-300 mb southeast of the TROWAL axis, in a region of intense subsidence (as seen on the 305 K map).

Question 8. Where would the heaviest snow fall? Explain your reasoning.

Subjective answer. Focusing only on the effects of rising motion in the TROWAL region, we think the heaviest snow will fall across southwest and central South Dakota. There is strong frontogenesis in the lower levels coupled with the rising motion associated with the TROWAL, although the frontogenesis is shallow. The TROWAL signature is weak, thus we are not expected impressive snow totals relative to typical spring snow storms across the region.