IC7.1: Optional Job sheet Answer Key

Monitoring Model Accuracy

Question 1. Are there any short wave troughs in the model output that are merging or phasing with the deep long wave trough over the Great Lakes?

The closed low over southern Baja Mexico does not appear to move over the last 12 hrs and minor short waves rotating to the northeast of that low shear apart rather quickly. Thus, this feature should not affect the short wave in the northern plains. The feature of interest across South DAkota at 12 UTC if moving very quickly in the strong 500 mb flow. As it approaches the deep long wave trough across Ontatrio, it too does not appear to merge with the feature during this time period. The bulk of the long wave trough progresses east into Quebec leaving behind a positivily tilted short wave trough just north of Lake Huron. Over the next 24 hr the plains fast moving short wave trough may merge or phase with this feature. The model indicates a short wave trough across north-east North Dakota/southeast Manitoba, though on WV imagery it is less than impressive. This feature will affect the model solution regarding the plains short wave trough, and should be watched closely.

Question 2. Does the NAM have the short wave trough well analyzed?

It has the short wave trough across South Dakota pretty well analyzed at 12 UTC but it looks to be a tad too slow with it’s progression.

Question 3. Is there any evidence that the surface cyclone is more intense or taking a different track than the models predicted? Explain your reasoning.

The NAM 40 model is too weak and too slow with the intensity and progression of the surface cyclone, especially evident at 9 UTC which is a 9 hour forecast. At 12 UTC the NAM analysis has a good geographic placement of the surface cyclone across south central Nebraska and nothern Kansas but is 2 mb too weak.

Question 4. Where is the convection located relative to the surface cyclone?

Lighting was observed at 6 UTC just northeast of the surface cyclone in northwest Kansas, pointing to an intense surface cyclone. After 6 UTC there was any lightning

observed with this storm system but cold cloud tops were evident to the north, northeast, and east of the surface cyclone through 13 UTC (the current time).

Question 5. How might the convection affect the surface cyclone track or intensity?

The presence of convection as mentioned in the training module, can wreck havoc on model solutions. In this case, convection to the east and northeast of the surface cyclone could lead to an intensification of the surface cyclone and this could be inferred from 06 -13 UTC with this event. Fortunately for the model's sake, convection after 06 UTC wasn't strong enough to produce lightning but could still be strong enough to affect model output and would need to be monitored.

Question 6. Where is the dry slot?

At 12 UTC via WV imagery the dry slot is located from northeast Nebraska soutwest into eastern Coloado.

Question 7. How did the NAM 40 12 hr forecast handle the location and movement of the dry slot?

The NAM 40 forecast was too slow with the dry slot, analyzing the dry toungue too far southwest of where it actually was.

Question 8. Where is the change-over to snow occurring over the last hour or two?

Southwest Iowa

Question 9. How are the models handling surface conditions? Too cold? Too warm? Bad timing?

The NAM forecast temperatures were far to warm (~5 F) across sand southern Iowa, especially at 09 UTC (9 hour forecast), and too cold across southern Nebraska. The NAM appears to overestimate the northward advancement of warmer surface termpatures to the east of the surface cyclone, and pushed the cold front too far south.

Question 10.What is the primary cause of the changeover to snow?

Though the soundings indicate near saturation from near the surface to the mid-levels, surface obs in southwest Iowa indicate dewpoint depressions of 8-9 F. Thus, as snow melts in the surface layer (indicated by drizzle/rain obs) this layer should cool quite a bit, such that a change-over to snow occurs. That's exactly what occured at 11 UTC in southwest Iowa.

Question 11. Will you have to worry about sleet or freezing rain anywhere across Nebraska or Iowa? Why or why not?

Shouldn't be any sleet or freezing rain since the warm advection east of the surface cyclone is not contributing to the development of a warm layer aloft. All across Nebraska and Iowa soundings are below freezing aloft besides the right at the surface.

Question 12. Where is the radar bright banding occurring, and at what height?

On the KOAX radar there is possibly some bright banding south of the radar (~15 nm south) from ~11-13 UTC, at a height of 1200 ft AGL/2300 ft MSL. It is most likely bright banding because the Lincoln observation reports rain as the zone of higher reflectivities passes over. There is no bright banding on KDMX

6. Assessing Pitfall #6: Mesoscale banding

- Swap panes and get to the state scale. In the volume browser, load the NAM 40 model run snow accumulation product, then overlay both KDMX and KOAX 0.5 reflectivity. (You will only be able to compare a few snowfall graphics to actual radar images because of the way AWIPS loads products)

Question 13. Is the NAM accurately depicting the nature of the mesoscale snow band across Nebraska/Iowa? Be specific.

Surprisingly, it is. Although there are location errors, it does appear that the NAM has a pretty good handle on the two separate bands of snowfall. One is northwest to southeast across extreme northeast Nebraska into central Iowa, and the NAM has this band placed too far southwest by about 200 miles. The other band is north-northeast to south-southwest from eastern to southeastern Nebraska. The NAM has this one properly placed but is too slow with the snowfall accumulations.