

APPENDIX A

FIGURES

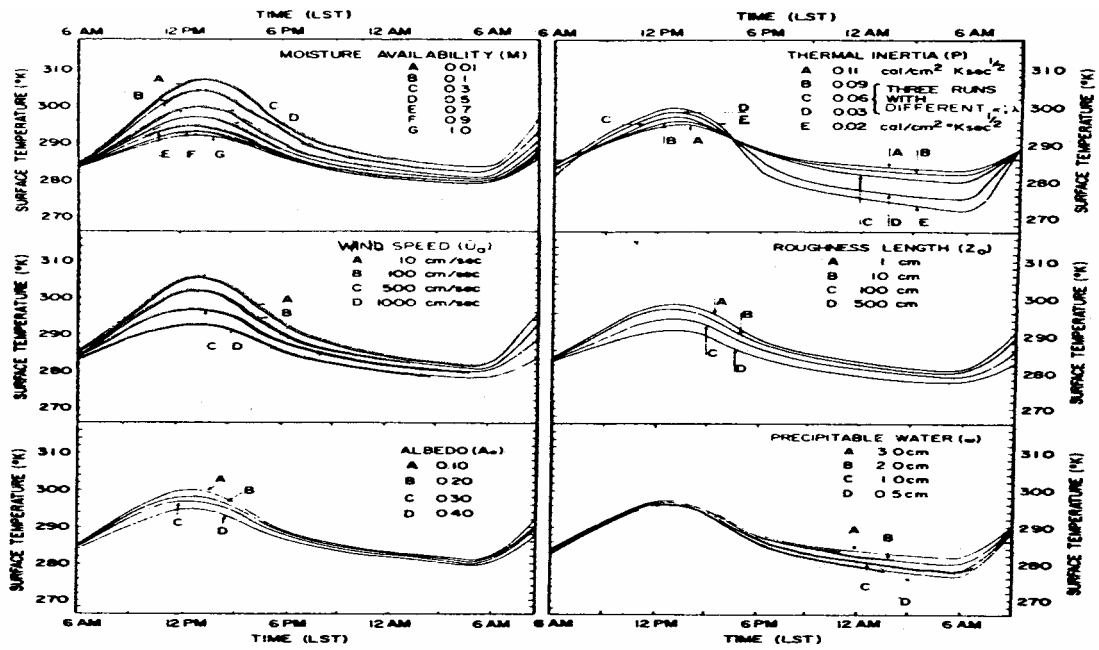


Fig. 1. Taken from Carlson (1986) to demonstrate the sensitivity of the surface energy budget model. Each panel represents the sensitivity of the simulated LST to uncertainty in a given parameter

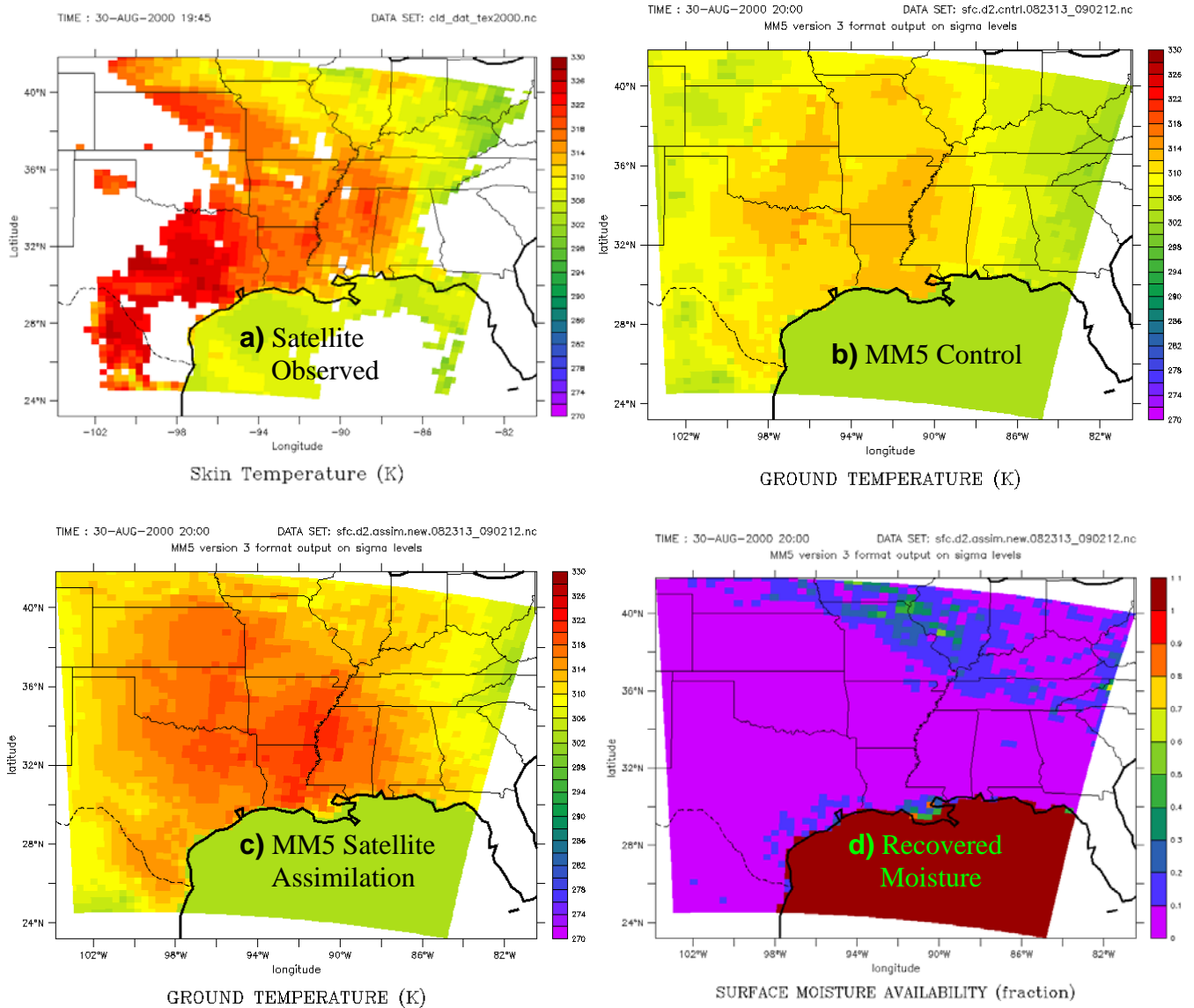
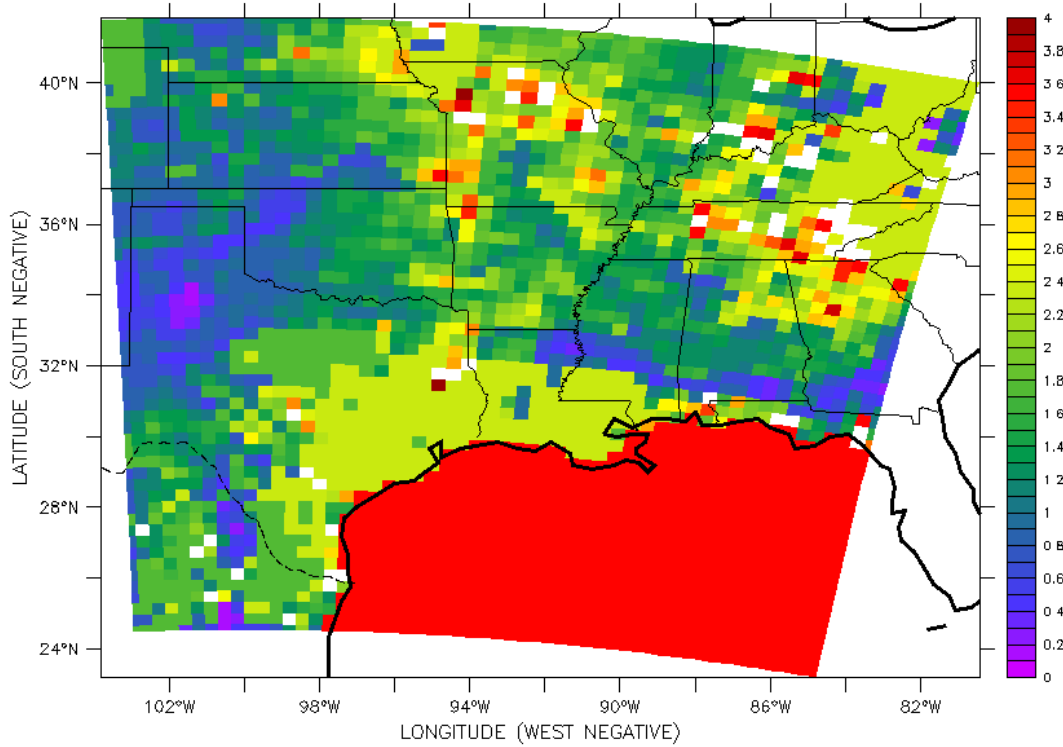


Figure 2. Skin temperature a) observed by satellite; b) from MM5 control simulation; and c) from MM5 simulation with satellite assimilation. Also d) recovered surface moisture availability for the assimilation run.

TIME : 25-AUG-2000 09:00

DATA SET: test.d2.nc

MM5 version 3 format output on sigma levels



Surface Heat Capacity * 1.E-6 (J/K/M³)

Figure 3. Inferred heat capacities for 36-km domain for the second day of simulation in our second attempt. This figure shows the problem of over-/under-adjustment in our initial attempt.

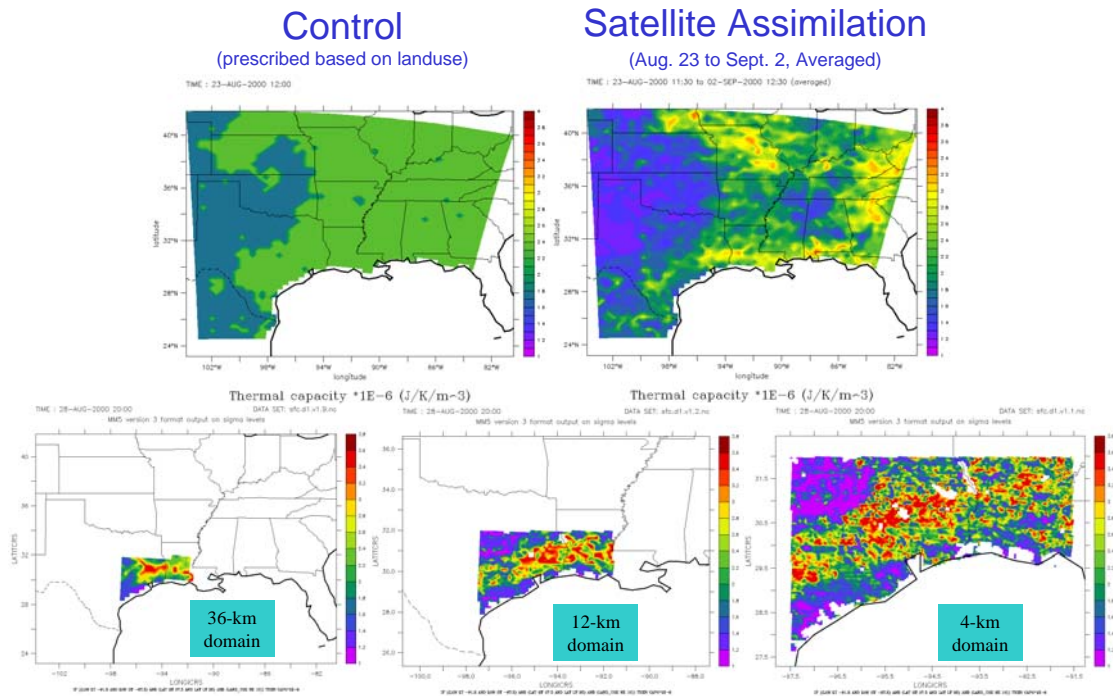


Figure 4. Thermal capacity for MM5 (top left) and satellite inferred for the 36-, 12-, and 4-km domains. The pattern over the 4-km domain remains the same in all simulations.

MM5 Layer-1 T vs. NWS observed 2M Temperatures
(12km Domain)

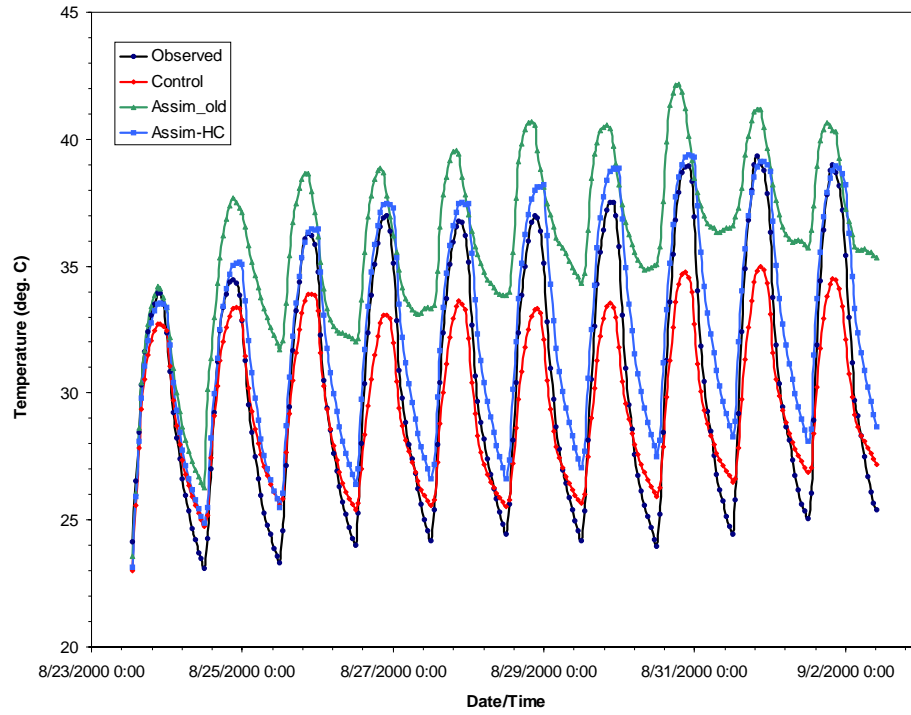


Figure 5. Comparing MM5 first layer temperatures with NWS observations for the 12-km domain.

**TEMPERATURE BIAS
(12-km GRID over Texas)**

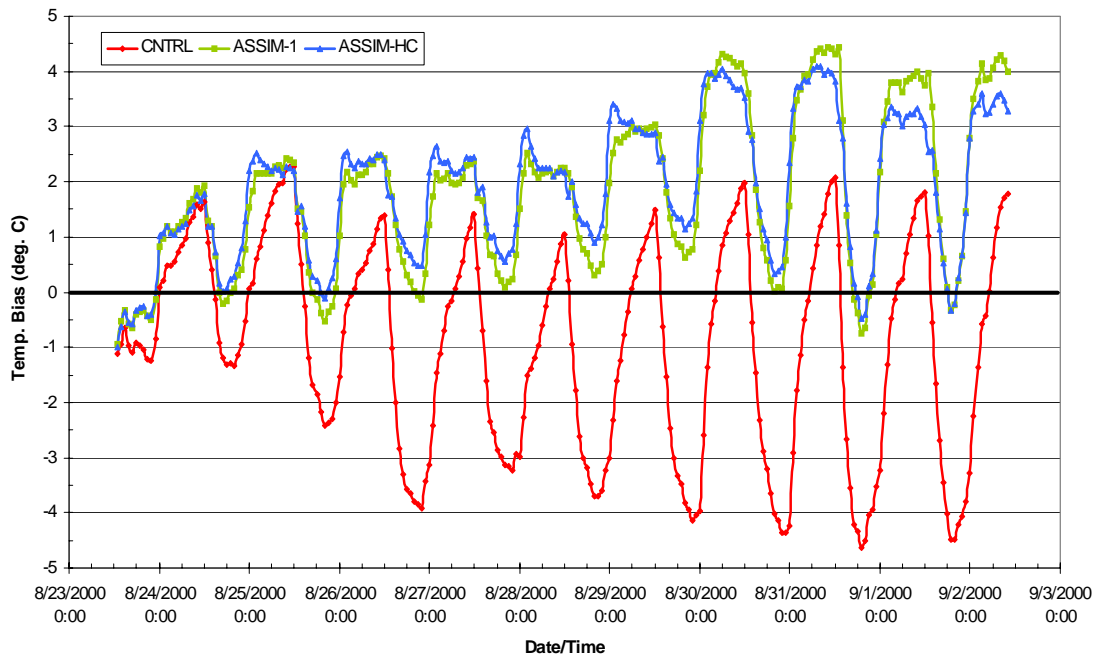
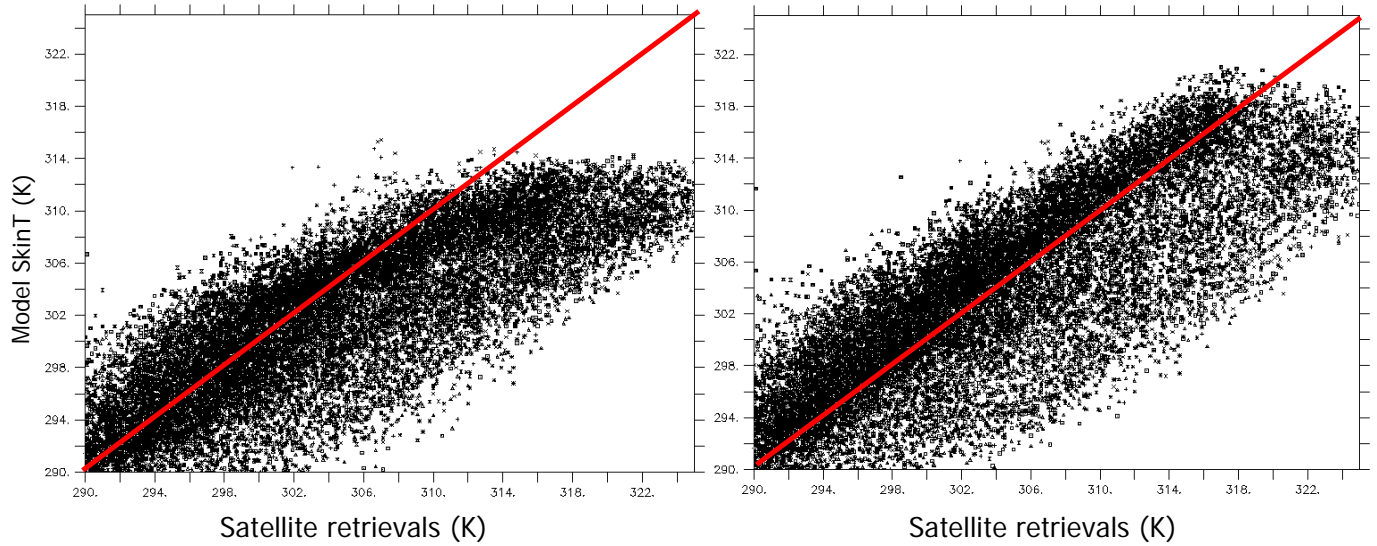


Figure 6. Comparing MM5 layer-1 temperatures to NWS 2-m temperatures. Results from three different runs are presented, control (CNTRL), satellite assimilation adjusting moisture availability only (ASSIM-1), satellite assimilation adjusting moisture availability and heat capacity (ASSIM-HC).

a) 108-km domain scatter plots



b) 36-km domain scatter plots.

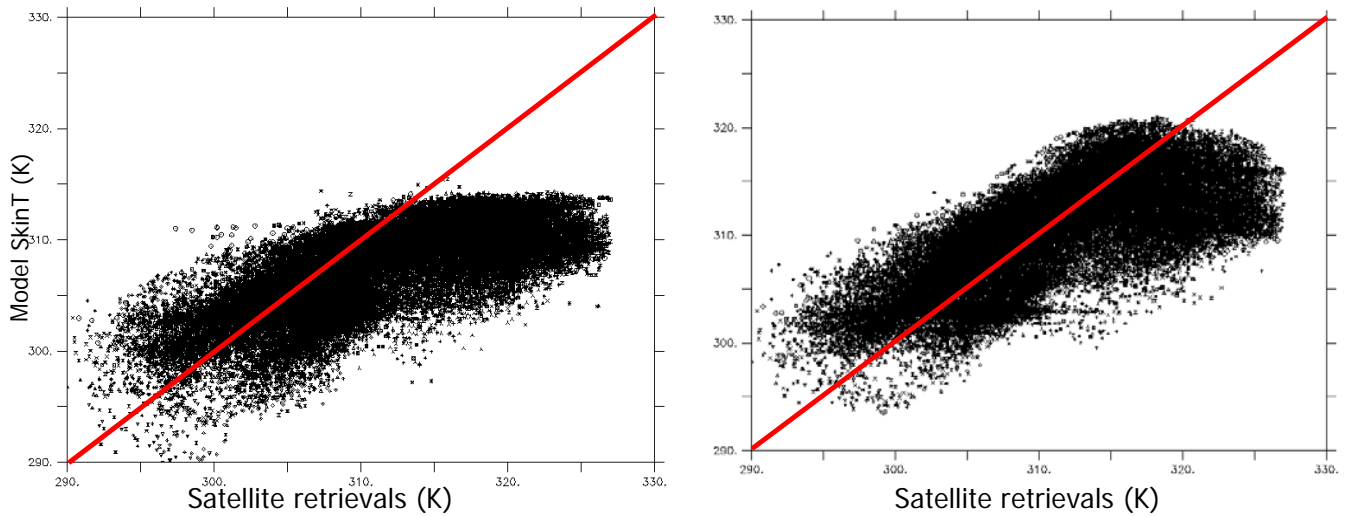
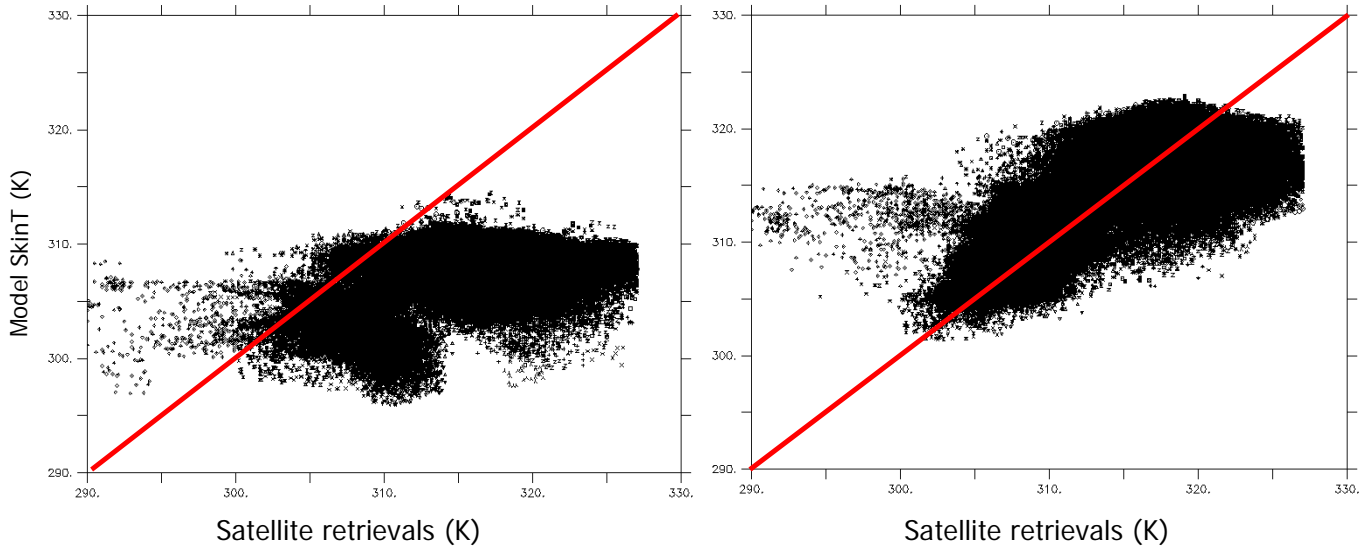


Figure 7. Skin temperature scatter plots, MM5 vs. satellite observed, for 14:00-21:00 GMT, August 25-30, 2000, over land. Left panel is from control MM5 simulation, and the right panel from MM5 with satellite assimilation. a) 108-km domain (domain 1); b) 36-km domain (domain 2).

c) 12-km domain scatter plots



d) 4-km domain scatter plots.

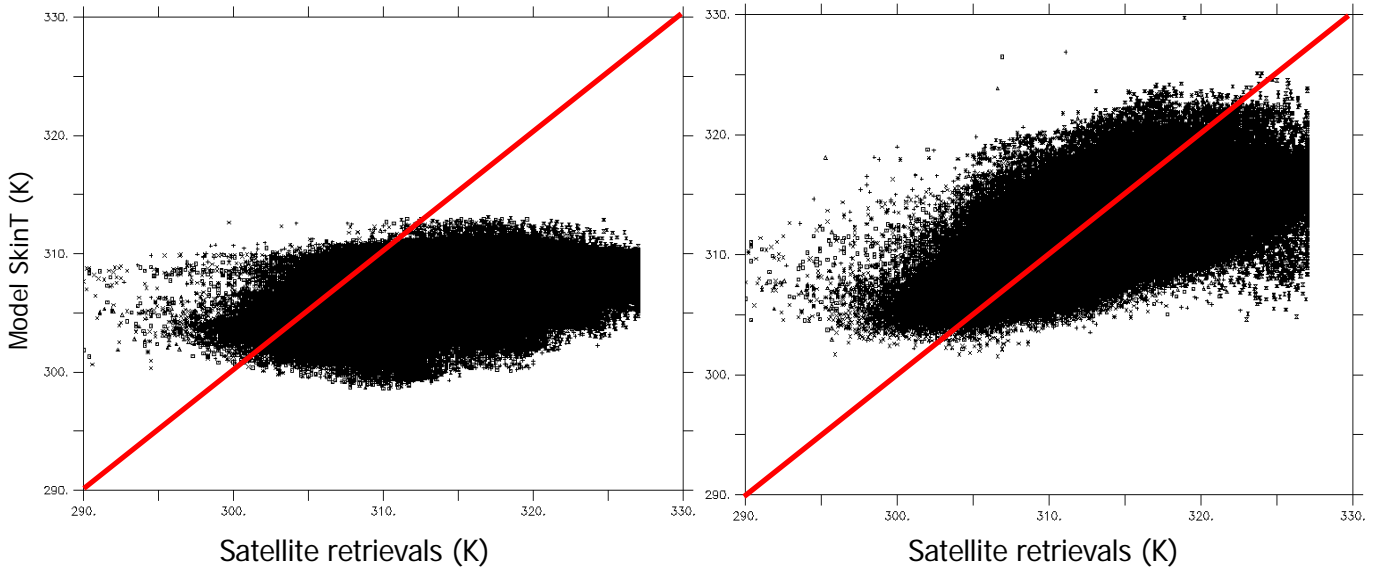


Figure 8. Skin temperature scatter plots, MM5 vs. satellite observed, for 14:00-21:00 GMT, August 25-30, 2000, over land. Left panel is from control MM5 simulation, and the right panel from MM5 with satellite assimilation. c) 12-km domain (domain 3); d) 4-km domain (domain 4).

Difference between MM5 Level-1 & 2-M Temperatures
(4-km Domain over Texas)

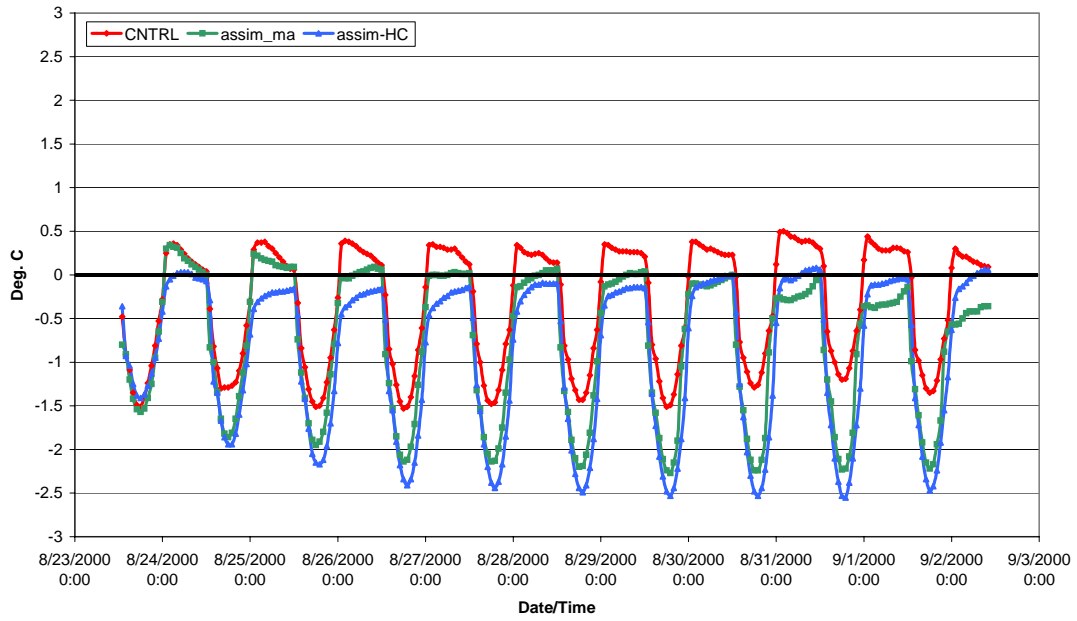


Figure 9. Difference between MM5 level-1 and 2-M temperatures. The red line corresponds to the control simulation; green line represent the assimilation run adjusting only moisture availability; and blue is from assimilation run adjusting both moisture availability and heat capacity.

2-M Temperature Bias
(4-km Domain over Texas)

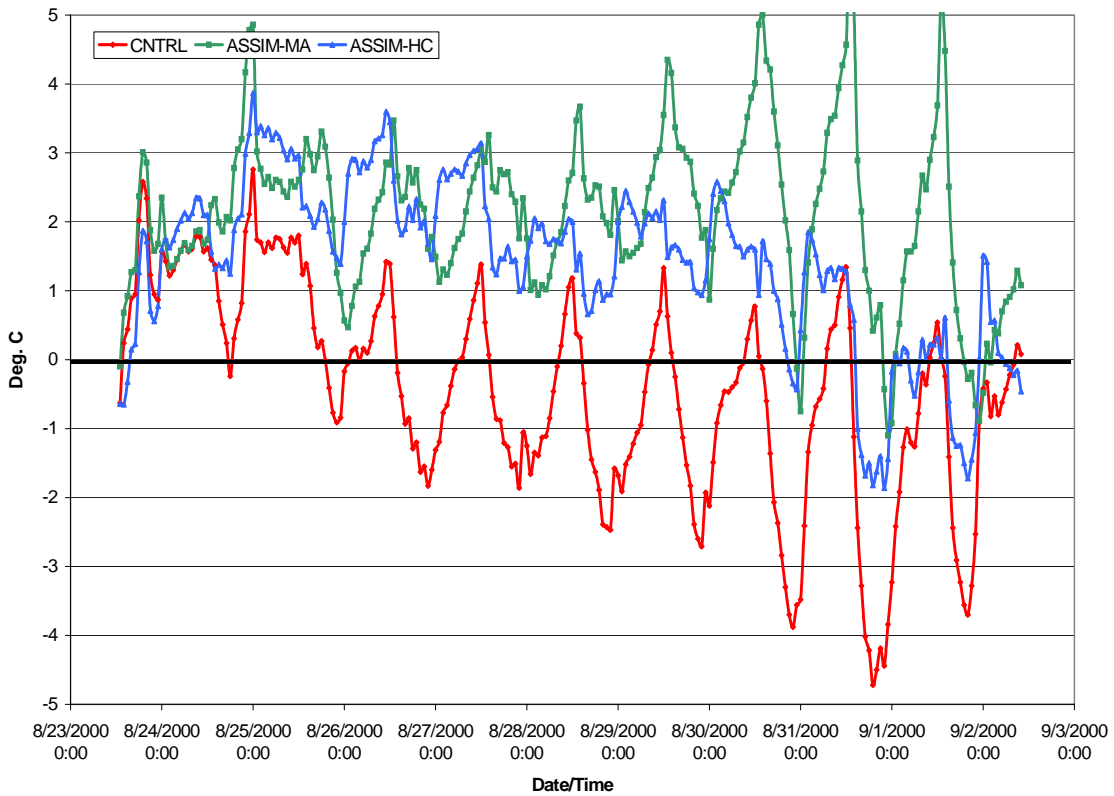


Figure 10. Averaged 2-M temperature bias for the 4-km resolution domain over Texas (TexAQS2000). NWS observations of 2-M temperature are used for the analysis. The red line represents the results from control simulation; green line is from a simulation utilizing satellite assimilation to adjust moisture availability ONLY; and the blue line is from a simulation adjusting both surface moisture availability and heat capacity.

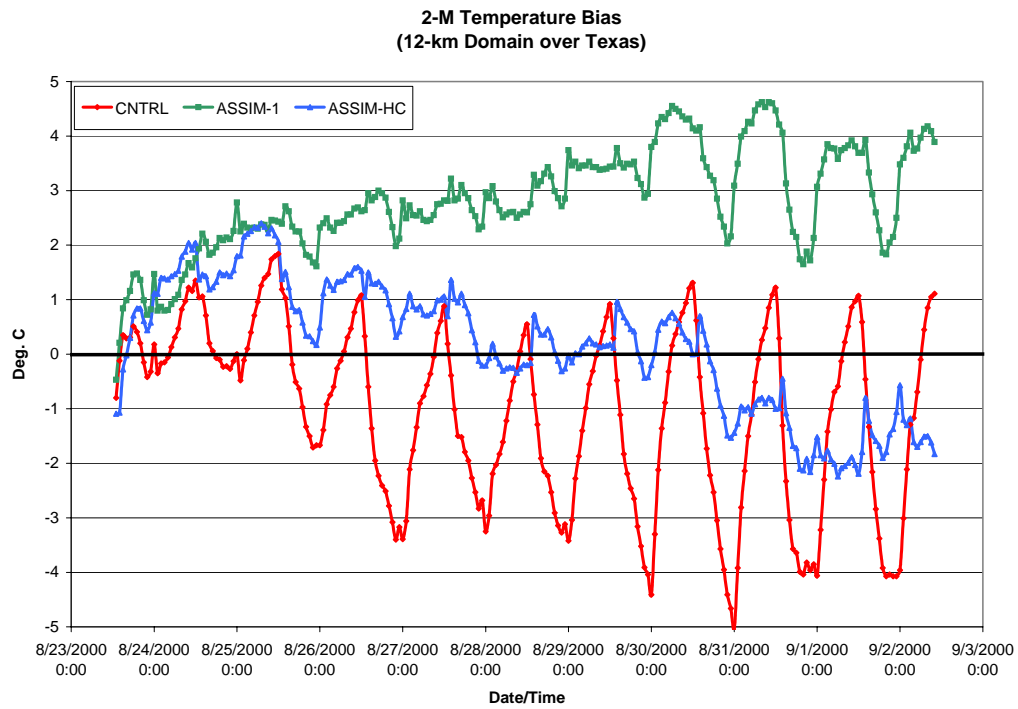


Figure 11. 2-M temperature bias for the 12-km domain over Texas. The color-coding is similar to figure 2.

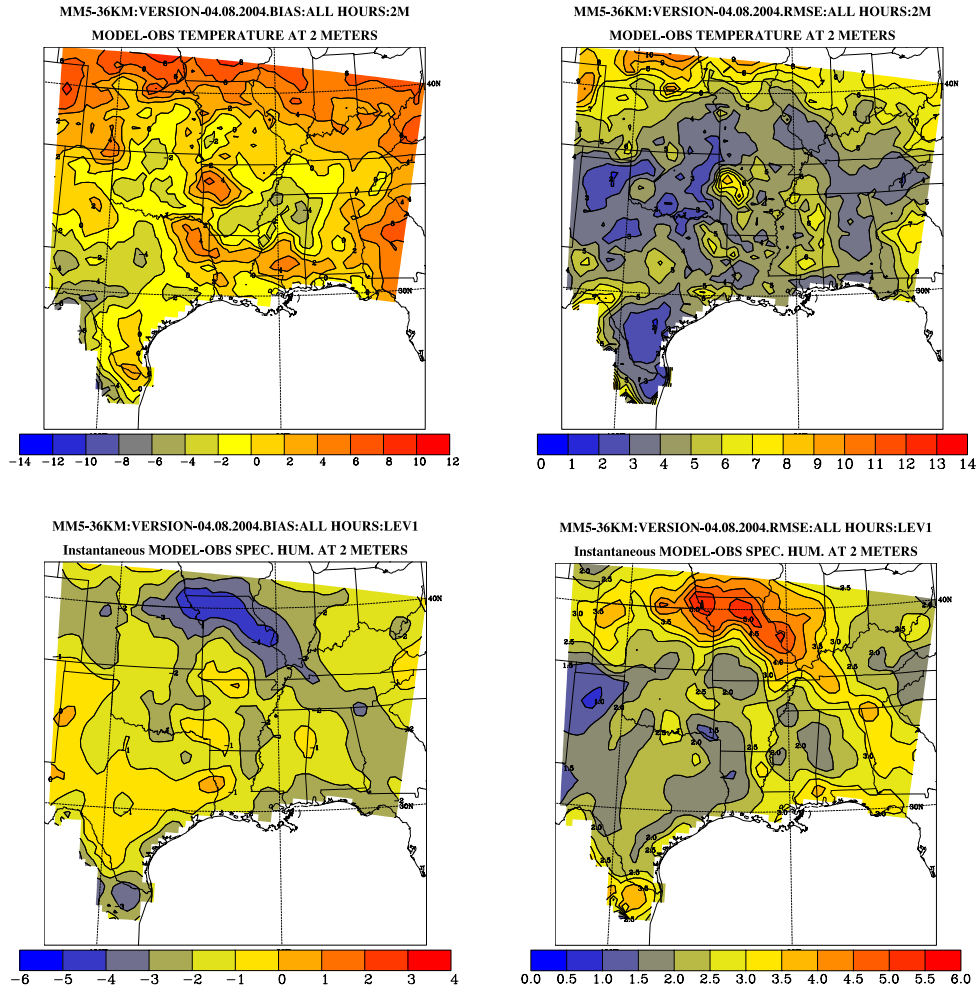
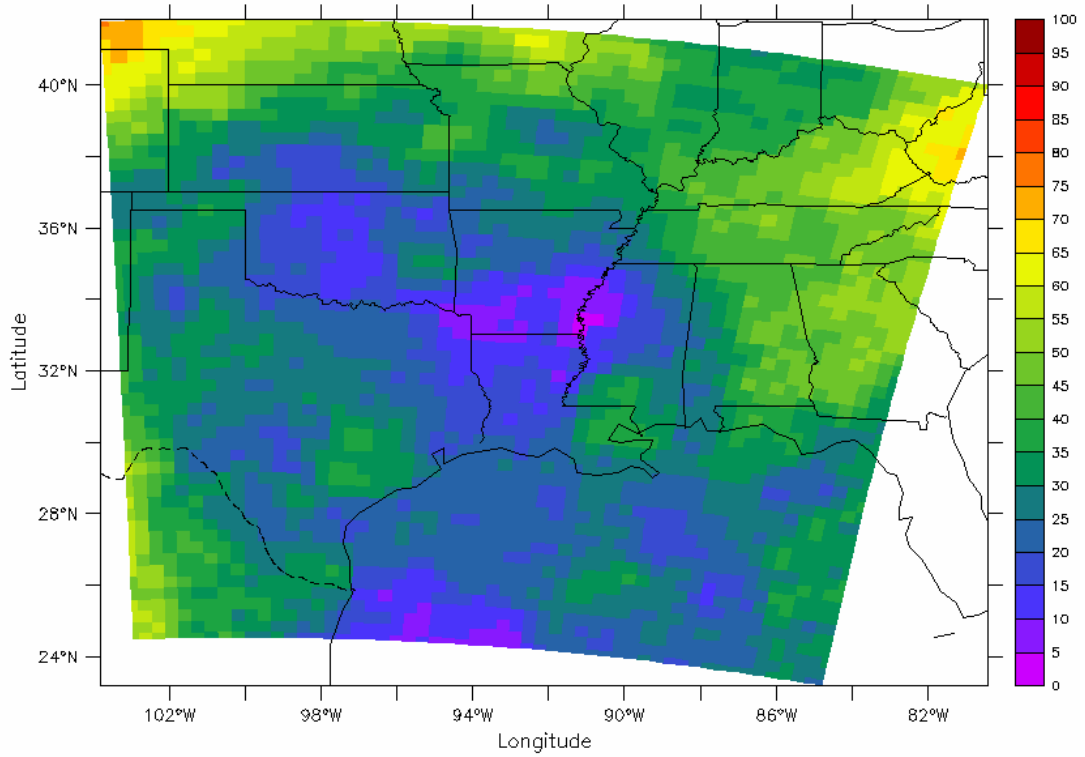


Figure 12. 2-M temperature & level-1 specific humidity bias and Root Mean Square Error for the 36-km domain for the entire simulation period (12 GMT, August 23, 2000, to 12 GMT, September 2, 2000).

TIME : 23-AUG-2000 12:15 to 02-SEP-2000 04:15

DATA SET: d2.nc



Percent of time a grid cell was cloudy (%)

Figure 13. Percentage of time a grid cell was cloudy according to GOES observation.

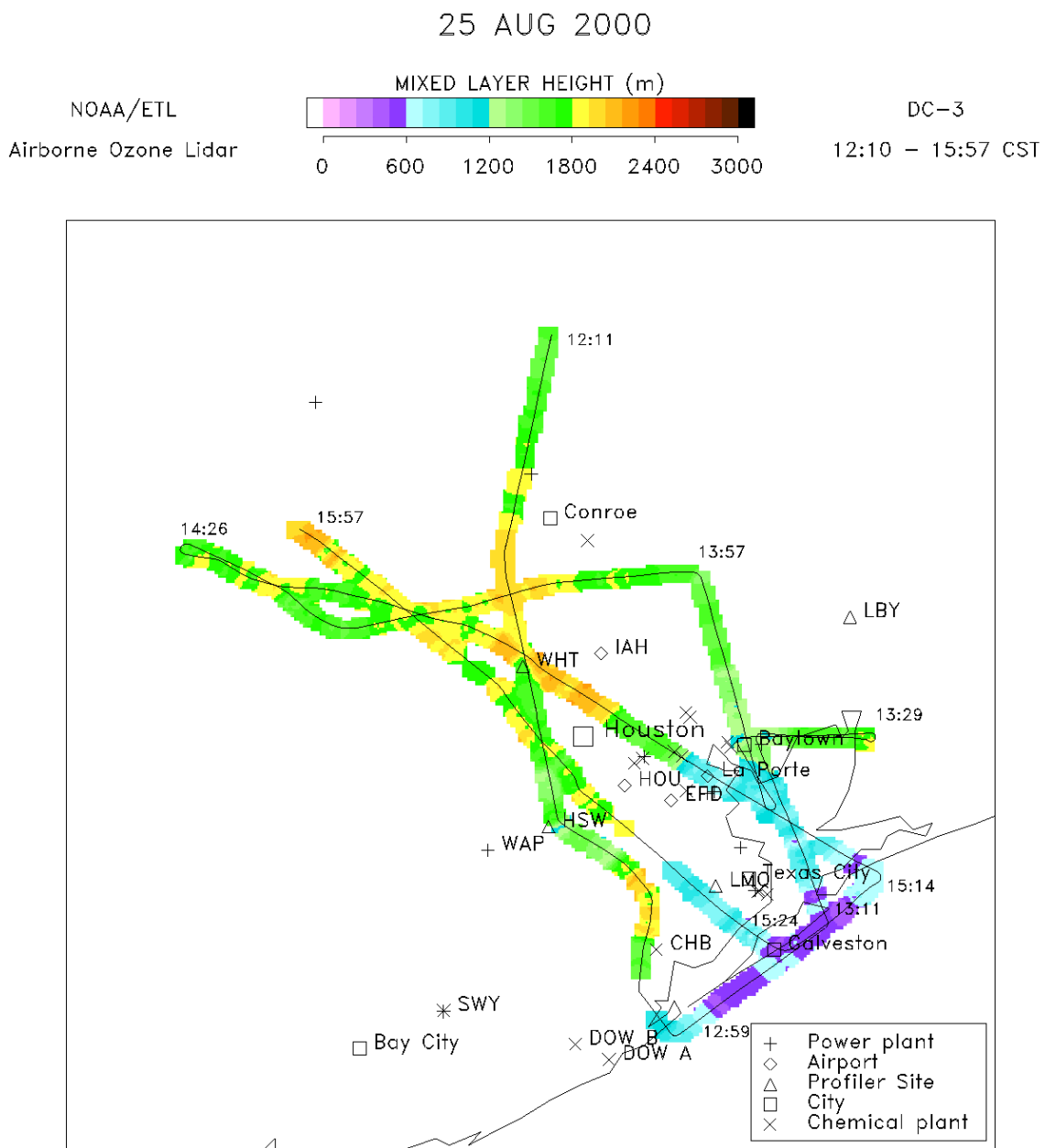


Figure 14. Observed boundary layer heights for August 25, 2000. Adapted from Sneff et al. 2003.

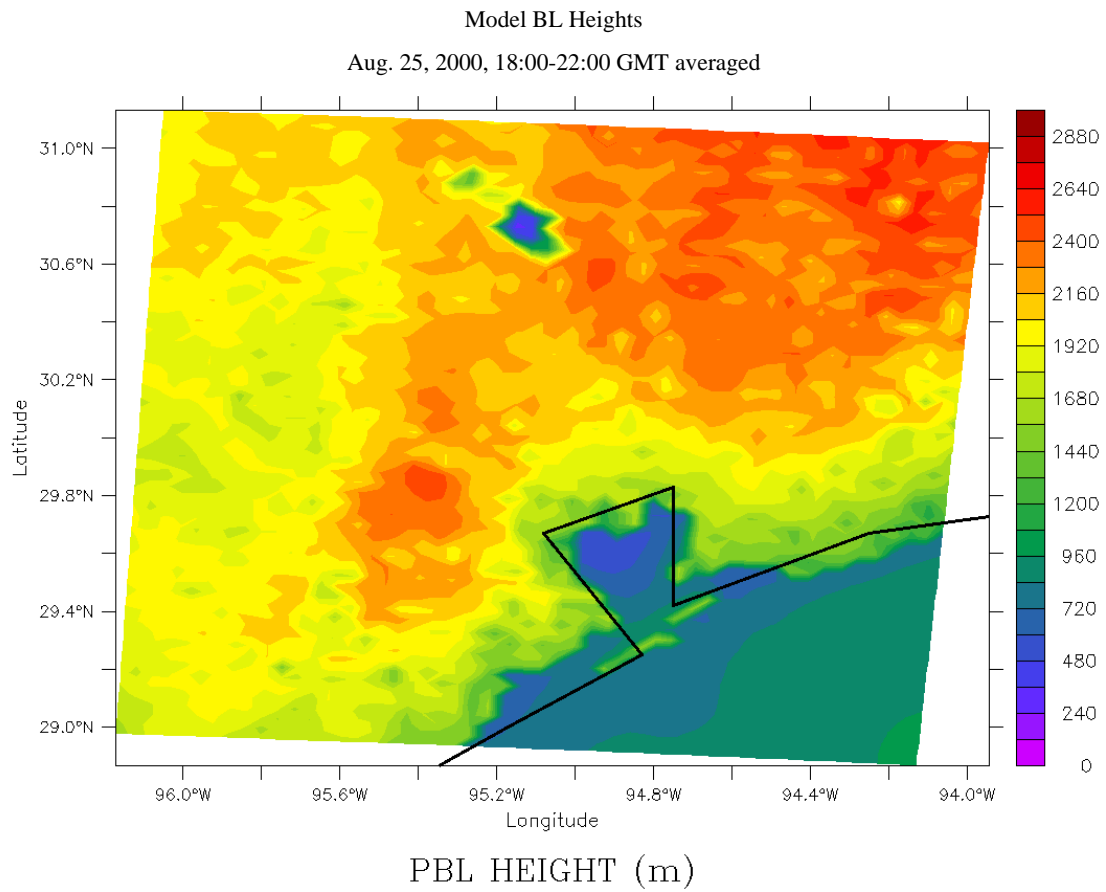


Figure 15. Predicted boundary layer heights from the MM5 simulation with satellite assimilation for the same period as in Figure 14. Model predictions from 18:00 GMT to 22:00 GMT have been averaged.

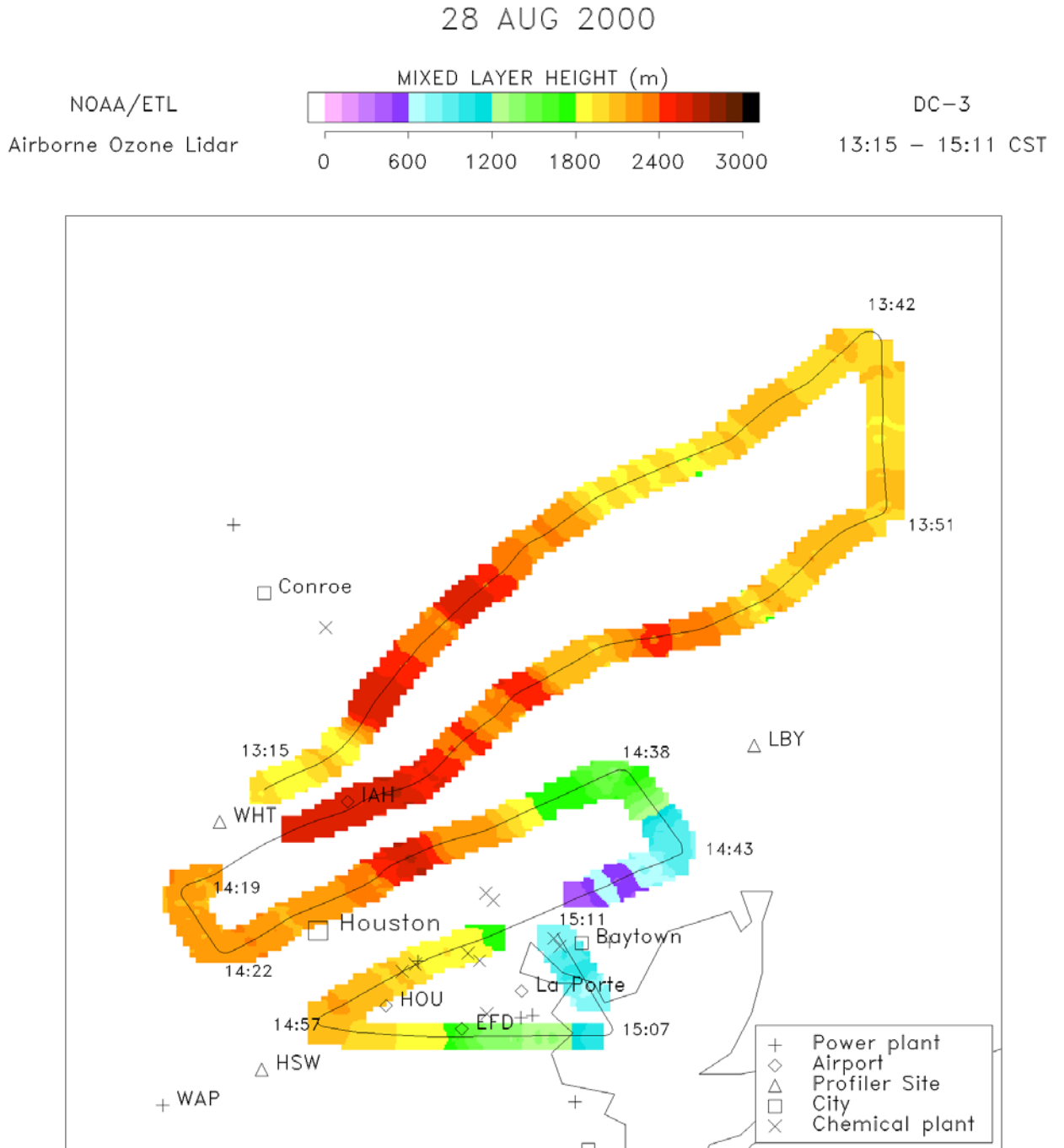


Figure 16. Same as figure 14 but for August 28.

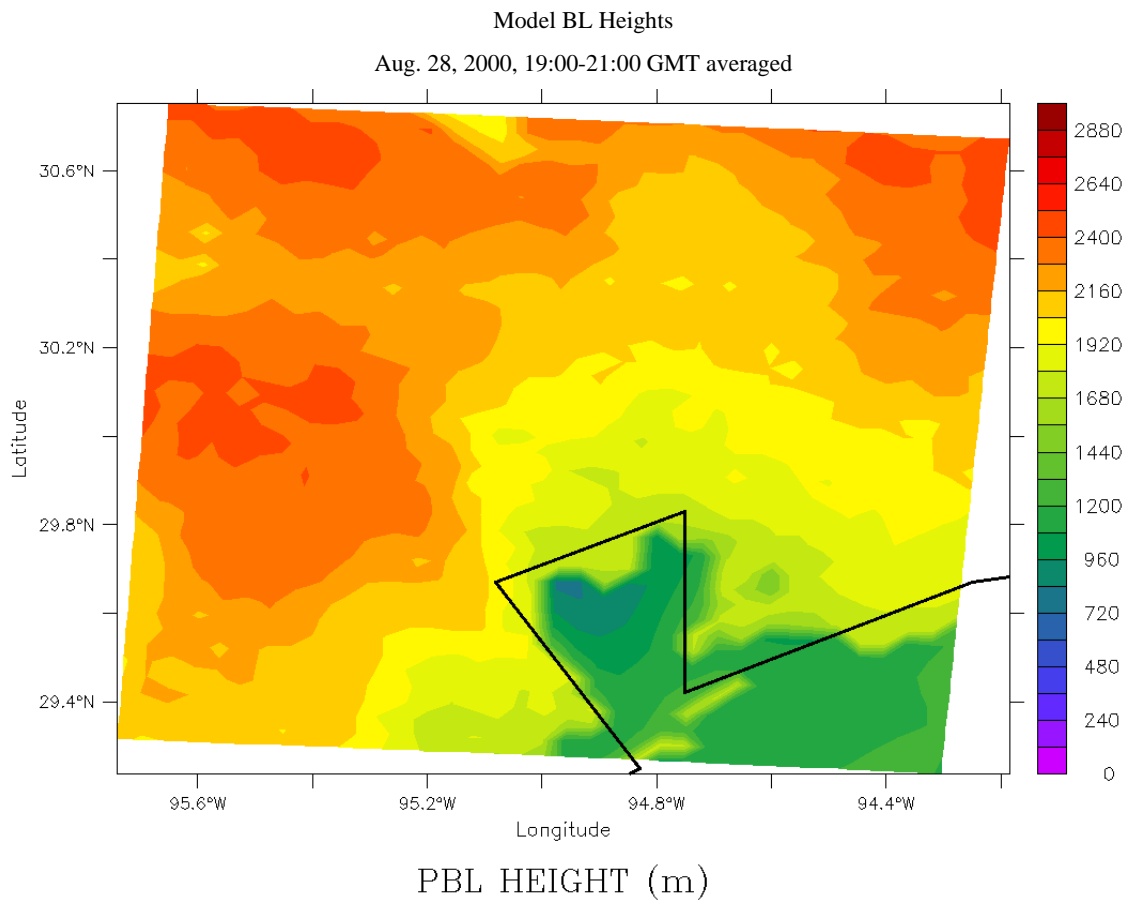


Figure 17. Same as figure 15 but for August 28.

