The Urban Heat Island at LMK

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As I live a little northeast of Louisville, I have noticed the heat island effect it produces. The other morning, my low temperature was 42, whereas the low at Standiford Field in Louisville was 49. The temperature sensor on my car also varies frequently during my drive into the office here on the south side of Louisville. Getting these variations into a minimum temperature forecast on GFE can be difficult, unless you have tools to highlight meso- to microscale features. The state of Kentucky has been installing a new mesonet over the last few years with the goal of identifying local weather effects on this scale. These data are imported into our observation program in GFE to identify, on the highest resolution scale possible, what the observed conditions are. These data are then used to compare how the various models do. The Boise WFO developed a verification program that works on providing actual comparisons. Using 30 days worth of observations, it calculates biases for each of the models and then creates a grid that removes that bias. The results (in the figures 1 to 3 below) indicate how the bias-corrected model does a better job of modeling the urban heat island effect that either the raw model or the MOS guidance grid, which is not calculated for as many points as are in the mesonet).

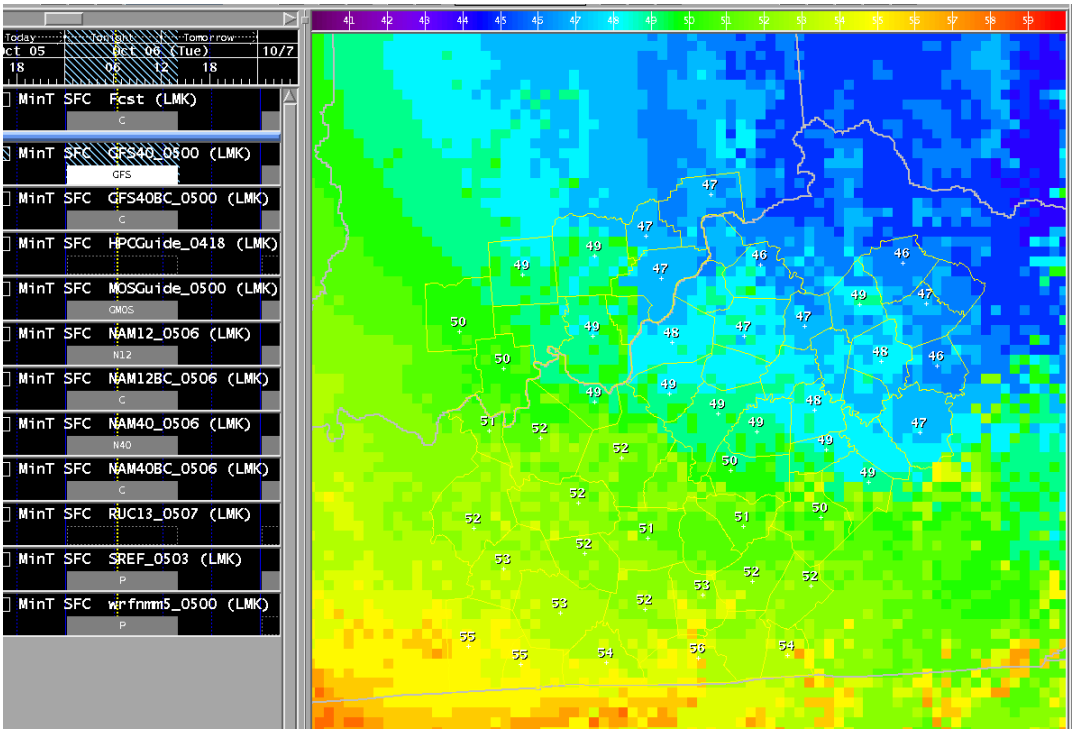

Figure 1: GFS40 forecast for minimum temperatures across LMK's CWA. Note the relative lack of difference across the Louisville metro area (the 48 towards the center of the map).

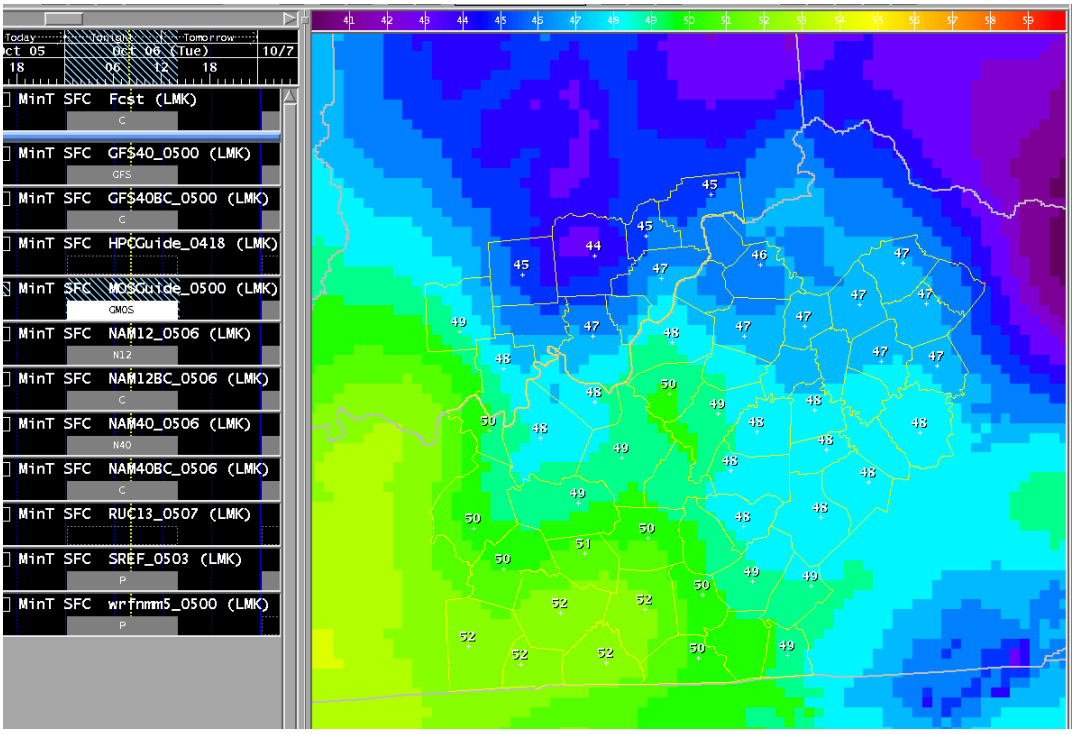

Figure 2: MOS Guidance Grid forecast for minimum temperatures across LMK's CWA. It has some variation with the southern suburbs but little to the north and east.

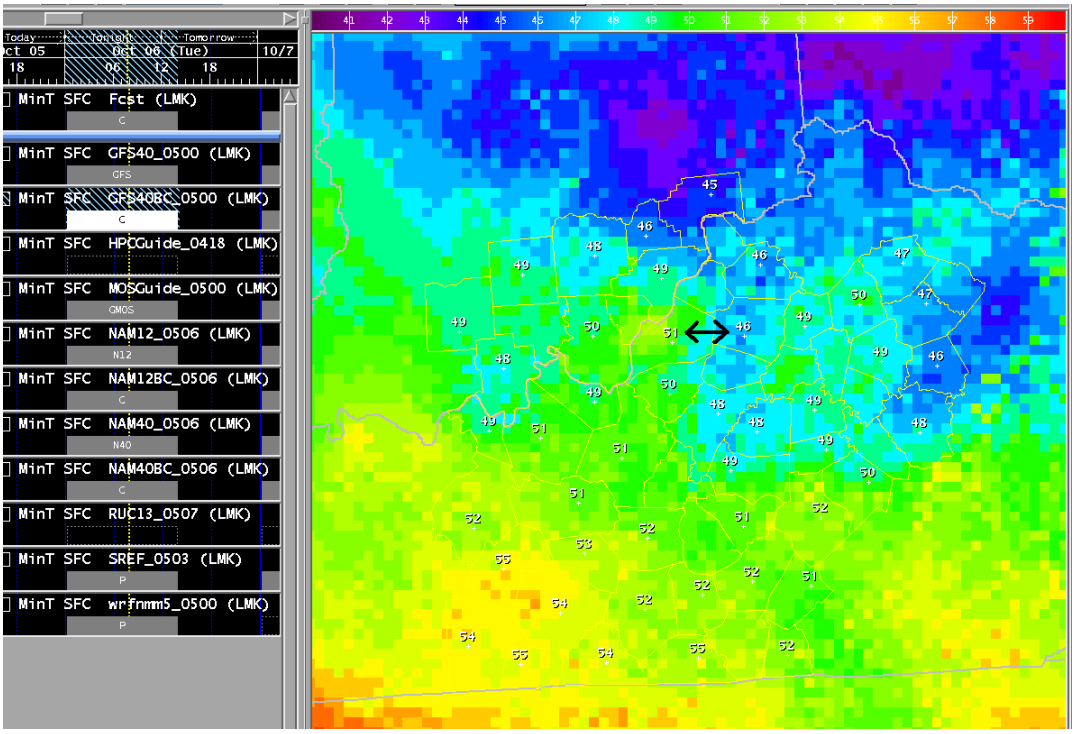

Figure 3: GFS Bias Corrected forecast for minimum temperatures across LMK's CWA. The black arrow indicates a much larger difference between warmer downtown and the eastern suburbs.