Microclimates of the Mid-South: Mississippi Delta effects on daily temperature

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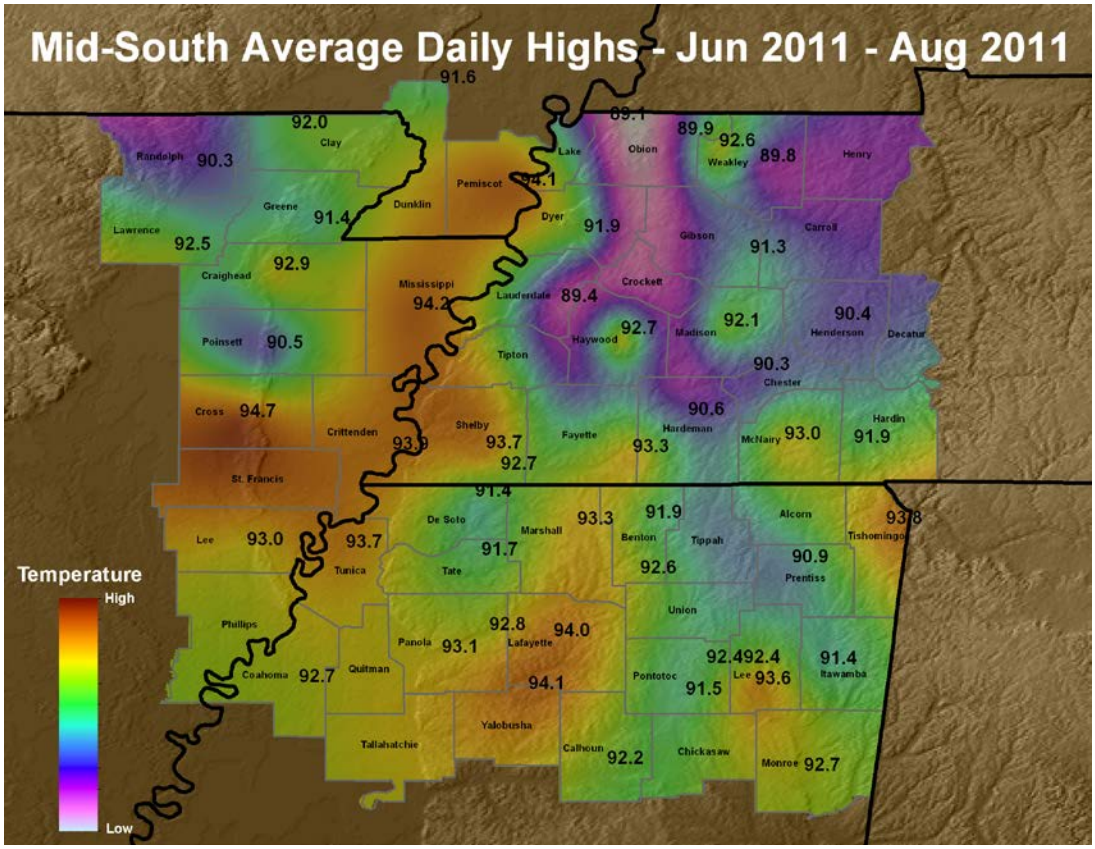
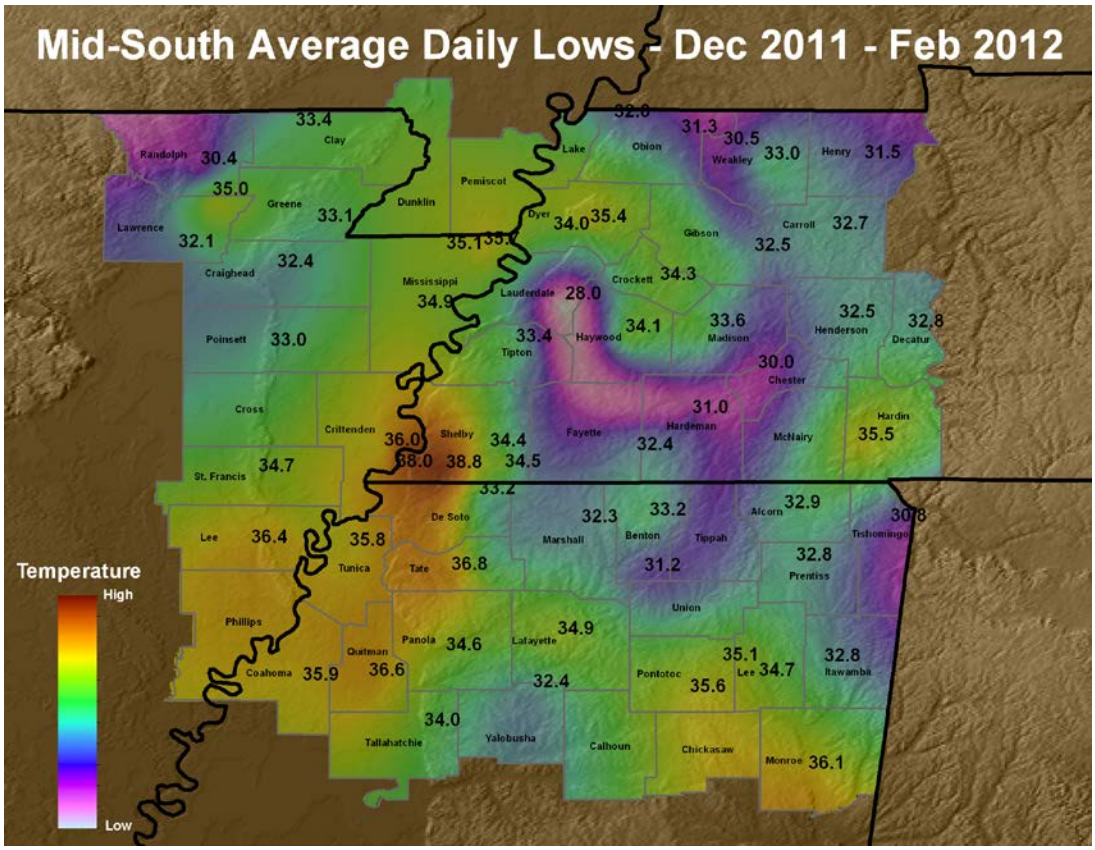
As discussed in the LMS lesson, microclimates can play a very distinct role in the outcome of a forecast over a given area. Thus, it seems imperative to try and investigate the local topography, and urban features to try and understand the impacts of microclimates within a particular CWA. In this brief write-up, I plan to use just one tool (GIS), to try and prove the existence of a microclimate in the Mid-South region. After a few years at the office it has become well know that the Mississippi Delta can play a very important role in the weather for the Mid-South. This most important and noticeable affect the delta has, is on temperatures and dewpoints. Using sources such as Cooperative Observers and the Automated Surface Observation System (ASOS), I will plot temperature data using GIS.

In my first year at the office I wrote a series of programs to plot temperatures data on a daily basis with GIS. However, I also archived this data in a GIS ready format for later use. When this assignment was brought to my attention I thought I could potentially use some of this data to try and prove the Delta effects. So, I wrote another program that reads the archived data and averages all the temperatures values within a user set range. The program also has the ability to throw out data that has a minimal number of reports during the time range that is selected. This “minimum number” is also defined by the user. For this study I just arbitrarily chose a minimum of 10 reports. Obviously, the higher the minimum is set, the more accurate the data will be in the end. However, since the majority of the reports are from Cooperative Observers, there are gaps in the data. So if a higher minimum is chosen, less data will be used. Further analysis of a more perfect minimum value could be performed at a later date. For this study, I chose to investigate average high temperatures during the warmest part of the year, and also average low temperatures during the coolest part of the year. The date range chosen was June – August 2011 for the warmest temperatures, and December 2011 – February 2012 for the coolest temperatures.

Below is a GIS produced map of the Average Daily High temperatures through the above mentioned range. Looking through the shaded temperature layer that is transparent, a topographical layer is visible. The Delta region is located just east of the Tennessee and Mississippi borders with Arkansas, and extends westward into east central Arkansas. Looking at the shaded temperature layer, it is apparent that the Average Daily High temperatures are elevated in this region. I also wanted to see if this correlated well during the winter time/cool season for the Mid-South. Below the first temperature map, is the Average Daily Low temperature map for the above mentioned date range. The same effects seem to be in place during this time of year as elevated temperatures can be seen from extreme southwest portions of the CWA, then extending northward into the Missouri Bootheel. Although the

temperatures values on each map are drastically different, the effects of the Mississippi Delta look to persist during both the warm and cool seasons, at least in this particular analysis.





Although in the images above it can be seen that there is some correlation to the increased temperature's and the presence of the Mississippi Delta region, the exact reason for this is still to be determined. Many factors such as vegetation, land cover, and topography could have impacts on this region. Further analysis would help to identify the characteristics that lead to this particular micro-climate effect in the Mid-South region.