The Cowskin Creek and its effects on the City of Wichita

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When working the forecast desk at the WFO Wichita, there are many different microclimates that forecasters should be aware of that affect the official temperature reading at Wichita. The Wichita ASOS which is located at the Mid-Continent Airport is the official observation for climate purposes. An obvious microclimate is the urban heat island effect downwind of the city. The airport is located just to the southwest of the city of Wichita, and when there is a light easterly or northeasterly wind, the temperature at the Wichita Mid-Continent airport will be quite warmer than surrounding ASOS or AWOS sites. However, the not so obvious microclimate of the Cowskin Creek can wreak havoc on forecasters who are new or are unaware of the effects of the Cowskin Creek. Figure 1 is a topographic image of the locations of the Wichita Mid-Continent Airport ASOS, Wichita WFO, and the Cowskin Creek. As shown in Figure 1, the close proximity of these locations is just less than a half of a mile.

Figure 1: This map shows the geographic layout and locations of where the Cowskin Creek and the NWS WFO is located in proximity to Wichita's Mid-Continent Airport ASOS.

The Cowskin Creek effect is a radiational process in which normally occurs during the winter months. When there is a light southwest or sometimes westerly wind, the drainage effects of the Cowskin Creek will usher in cooler temperatures towards the Wichita ASOS. Again this effect only occurs when there is a light, around 3-8 knots, of southwesterly or even

westerly wind. In fact, the process is more likely to occur when a surface high pressure sets up somewhere between Wichita to northeast Oklahoma, which creates light southwesterly or even westerly flow across the city of Wichita. This effect can also occur ahead of a surface trough; however the winds are normally too strong for the radiational process to take place. Over the past several years, it is apparent that models do not diagnose this local effect very well. However, the local WRF does try to account for the terrain; but in the case of February 10th 2011, all models and even the forecasts were too warm.

On February 10th 2011, the Cowskin Creek played a significant role to temperatures at the Wichita ASOS as well as WFO Wichita's MMTS (Max Min Temperature Sensor). The official climatological temperature reading at Wichita dropped down to -17° F. However, this is unrepresentative across the city of Wichita. Figure 2 is a map of the minimum temperatures recorded around the city on the same day. In fact the -17° F reading is the lowest Wichita has seen since 1982. The ASOS at Mid-Continent is several degrees cooler than the surround sites as depicted on Figure 2. This is due to the Cowskin Creek's local drainage effect. The difference between the ICT ASOS and the WFO MMST is significant especially since they are less than a half of a mile away. Surface data from this event indicate high pressure centered just south of the border in Oklahoma with light southwesterly winds across the city of Wichita. This combined with cool dry air allowed for the radiation effects from the drainage at Cowskin Creek to affect just the ICT ASOS.

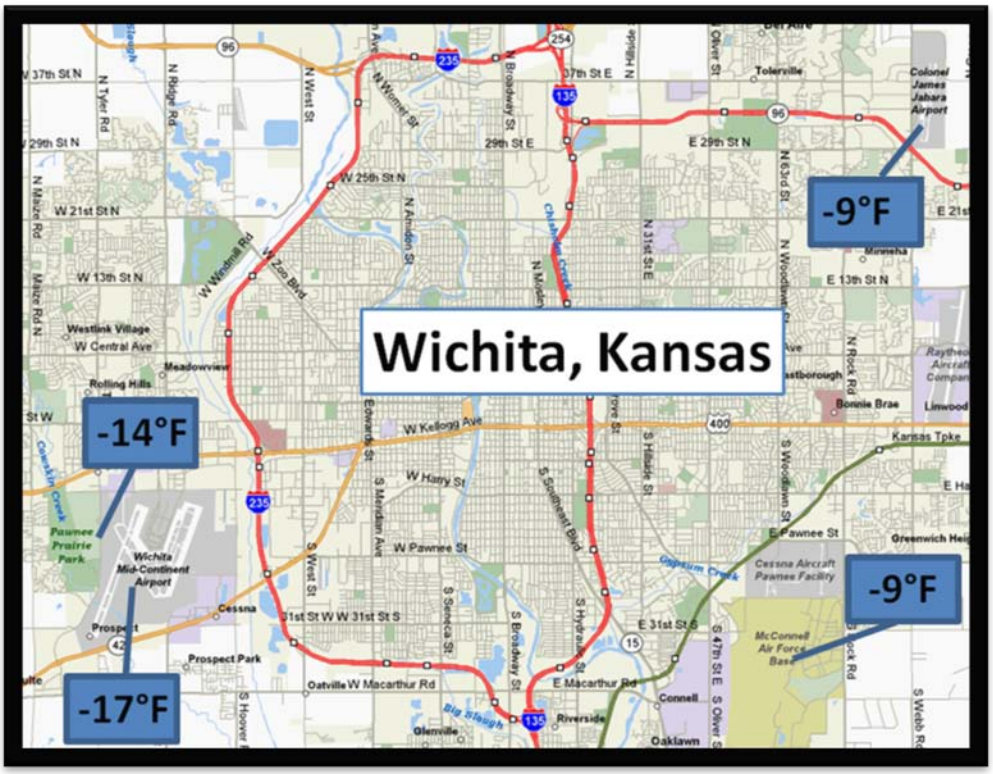

Figure 2: This map shows the low temperature readings on February 10th, 2011 at various AWOS and ASOS sites across the Wichita metro.

During the cold season, it is important for a forecaster to take a closer look at the potential impact of the local effects when determining minimum temperature for the city of Wichita. As this example demonstrated, the drainage from the Cowskin Creek can reduce the temperature several degrees than surrounding ASOS/AWOS sites especially with light southwest to west winds. By being aware of the local drainage effect the Cowskin Creek has and where the wind direction and speed is located, can help increase forecasters confidence and credibility when forecasting colder temperatures for the city of Wichita.