

IC4.3: Microclimates Exercise

The Des Moines Metro Heat Island

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All large metropolitan areas experience an urban heat island effect, and Des Moines is no different. The heat island is generally caused by materials used in urban development (such as blacktop), which tends to decrease albedo. Additionally, the density of buildings is much greater than rural areas; this tends to block outgoing longwave radiation at night. As a general rule, temperature departures are more pronounced with overnight lows.

Temperature data for Des Moines have been compared to other ASOS sites across Iowa. Monthly high and low temperatures were collected over a ten-year period and compared to Des Moines. During the winter months (see figure 1), high temperature departures ranged from -6.37 degrees at Estherville to +1.83 in Lamoni. These are respectively the northernmost and southernmost ASOS sites in our CWA, so this comes as no big surprise. Minimum temperature departures in the winter range from -7.10 in Estherville to +0.6 in Lamoni. Temperature departures at all sites were lower with min temperatures than with max temperatures.

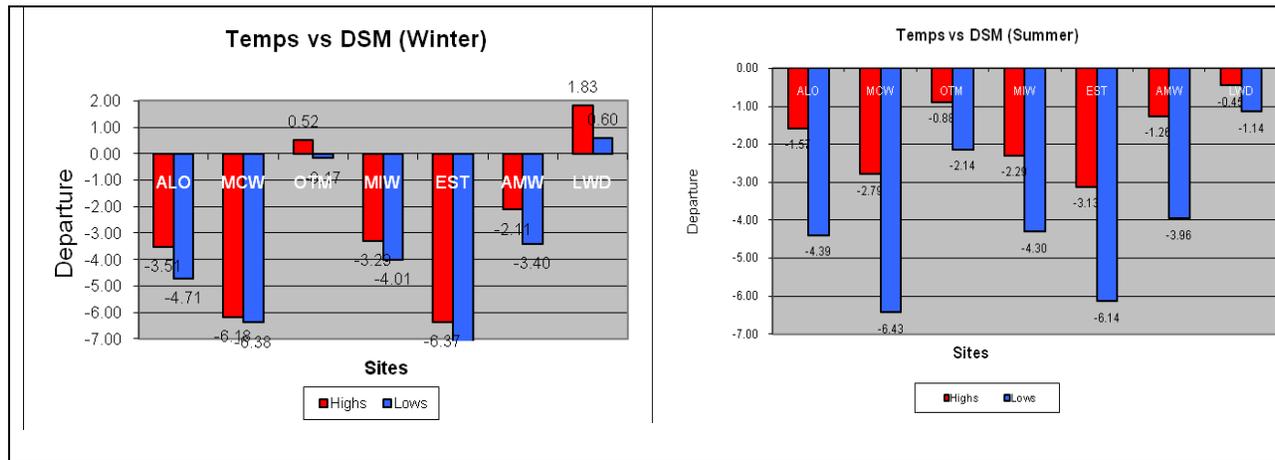


Figure 1: Temperature departures for winter (left) and summer (right).

During the summer, Des Moines is consistently the warmest with regards to the highs and lows across the state. Departures of high temperature range from -3.13 in Estherville to -0.45 in Lamoni. Low temperature departures range from -6.43 at Mason City to -1.14 at Lamoni. Again, note that the departures are greatest with the minimum temperature.

With the heat island in place over the Des Moines Metro, temperature forecasts are obviously impacted. The Des Moines airport is located just south of the city. Therefore, the heat island impacts are the greatest with a light northwesterly to northerly wind. MOS guidance has improved over the years in predicting temperatures, but still requires much improvement. Mesoscale models such as the RUC are also improving. In the end, pattern recognition and forecaster experience are paramount for a good temperature forecast for the Metro. An edit

area in IFPS has been created locally around the Des Moines metropolitan area as well as Waterloo, Fort Dodge, and Ottumwa. This allows easy temperature manipulation to account for the heat island effect.