

The Urban Influence in Changing Temperature Extremes Across the South Central United States Since 1950

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The goal of this research project is to lay a foundation for quantifying the hazards associated with temperature in urban areas by conducting a series of synoptic climatologies using surface observations in and near large urban areas. This will be accomplished by determining the long-term climate variability for three large urban areas and comparing these results to the associated climate division averages. The three urban areas that will be used are: Oklahoma City, OK, Dallas/Fort. Worth, TX, and Houston, TX. Within these cities, the following airports will be used: OKC and PWA, DFW and DAL, and IAH and HOU. In order to quantify the changes in urbanization for the three urban areas, GIS tools, satellite data, and aerial photography will be incorporated. Once this step is complete, COOP data will be incorporated and data quality and completeness will be assessed by setting thresholds and also constructing daily climate division averages.

The next step in the process will use COOP data to stratify all of the temperature data by decade using specified thresholds for the past 58 years. The 90th, 95th, and 99th percentiles will be assessed to determine changes over the past fifty years for each urban area. Next, the change in degree-days will be investigated. Once this is complete, various comparisons will be performed including: airport data within the city, airport data versus climate division data, and early summer (May/June) versus late summer (July/August).

The final step will be to examine the magnitude and circumstances under which strong urban heat islands develop and dissipate in Oklahoma City, OK using data from the Oklahoma City Micronet (OKCnet) during the warm seasons of 2008 and 2009. This analysis is particularly important because it will use a smaller resolution to investigate the urban heat island effect than the previous analysis which utilized coarse-resolution COOP data.