Fine Particulate Matter in the Dallas/Ft. Worth Area

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Status Report

Completed Work

The first task for the project was the determination of the historical data related to particulate matter (PM) concentrations and other air quality parameters in the Dallas-Ft. Worth area (DFW). The list of monitoring locations for DFW and the corresponding latitude and longitude in decimal degrees was obtained from the TCEQ website into an excel spreadsheet.[1] The twenty five monitoring sites that are currently active in the DFW area were selected for future study while non-operational sites were not considered. The sites were divided into five categories based on the type of data that was collected at these sites based on the value in a column called site types. These included Ozone Only, Ozone and PM, Ozone and PM Compliance, Meteorology Only, and PM Only. The distinction between PM and PM Compliance is whether the sites currently collect PM data (PM) or only historically collected PM data (PM Compliance). Of the 25 TCEQ monitoring sites in DFW, only 8 have collected PM data at any time during the last decade. Some of the historic collection points have been discontinued for PM due to funding concerns. For sites that had collected PM data, the average hourly concentration ($\mu g/m^3$) and maximum hourly concentration ($\mu g/m^3$) were collected from the TCEQ website for each year that they were available at a particular site between 2000 and 2010. For the 8 sites with PM data, the average hourly concentration, the average maximum concentration, and the maximum of the maximum concentrations were calculated in excel from among the years with data. A null value of -999 was assigned for the dataset.

The counties and map of Texas dataset from the first in class exercise were added to a new ArcMap document. The excel workbook was added to the ArcMap document and the monitoring sites were added to the map of Texas with the same NAD1983 Albers Projection to preserve surface area. The symbology of the monitoring site feature class was changed to be related to the value in the Site_Type Field. The monitoring sites with PM data were given triangular shapes with bright but distinguishable colors while the sites with only ozone or meterology data were given circular dull colors.

The subset of the counties feature class that contained a monitoring site were selected and exported to their own feature class for display purposes entitled DFW_counties. An additional column was added to the DFW_counties feature class attribute table where the names of the thirteen counties of interest were added to the data. The selected counties for the DFW area are displayed in the following figure:
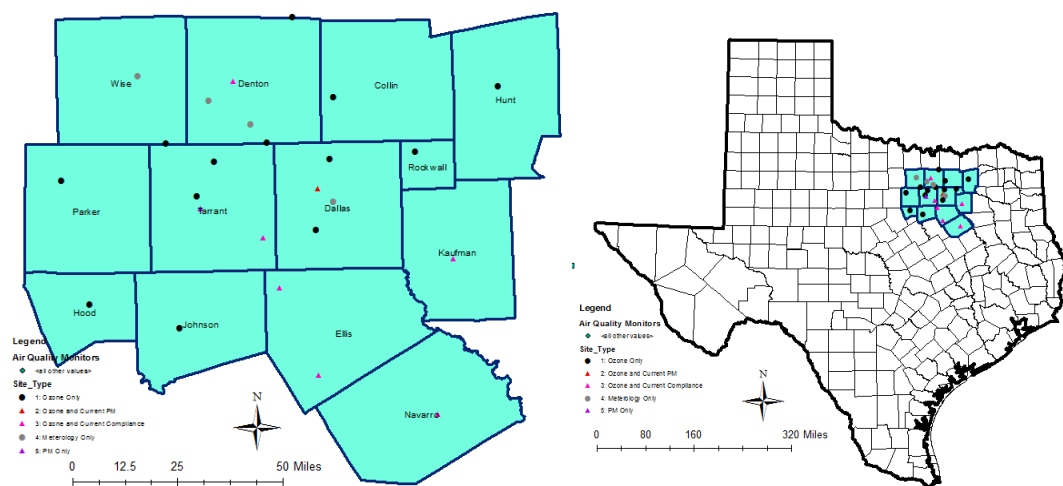
Figure 1: DFW Counties Maps

Future Plans

The census data for each of the counties of interest needs to be downloaded. The population density can then be calculated based on the population and the area of the counties above. The center point of each of the counties should be found using built in tools in ArcMap. The distance from the center point of the county to the nearest currently active PM monitor will be calculated off-line in excel as the minimum distance to a current monitoring site. The historic PM data in terms of average hourly value, maximum annual value, and maximum recorded will be interpolated over the domain using a Kriging interpolation method. Areas with high population density, high distance from a current PM monitor, and high interpolated PM values will be determined based on the results above. The best sites for future PM monitors will then be chosen from the current TCEQ monitoring sites in the area that do not currently measure PM concentrations. Any discrepancies between the top site choices based on the three interpolations (average hourly concentration, average yearly maximum concentration, and maximum hourly recorded value) will be discussed.

Works Cited

[1] Texas Commision on Environmental Quality (TCEQ)
http://www.tceq.state.tx.us/cgibin/compliance/monops/yearly_summary.pl?cams=88