Interpolation of Fine Particulate Matter Concentrations ($PM_{2.5}$) in the Houston, Galveston, Brazoria (HGB) Non-Attainment Area

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Objective:

While the Texas Commission on Environmental Quality (TCEQ) maintains approximately 60 monitoring stations in HGB Non-Attainment Area that measure ambient ozone concentrations, only a small subset (10) monitors have the capability to measure fine particulate matter ($PM_{2.5}$) concentrations[1] to determine compliance with the National Ambient Air Quality Standard (NAAQS) of 15 µg/m^3 on an annual arithmetic average basis.[2] Higher levels of particulate matter have been linked to increased hospital visits for respiratory ailments and increased overall morbidity.[3] The objective of this project is to determine which additional TCEQ monitoring stations should be equipped with $PM_{2.5}$ monitoring technologies based on the criteria of having higher levels of $PM_{2.5}$, high population density, and high distance from current monitoring sites.

Data:

- *Location and $PM_{2.5}$ observation data for HGB Area Monitoring Stations* (from TCEQ[1])
- *Population density data for HGB Area census tracts*(from ESRI via the US Census Bureau[4])
- *Location data for ozone monitoring stations in HGB Area* (from TCEQ[1])

Outline of Project Steps:

1. Create a basemap of the HGB Region including major highways to give location perspectives.
2. Import census tract data (population density) to ArcGIS
3. Calculate Annual Average Concentration of PM2.5 data from each of the current observation stations and convert location to usable form for GIS
4. Calculate the minimum distance for each tract from a current monitoring site and add to data set for population density
5. Interpolate $PM_{2.5}$ data between monitoring sites using Kringing Method
6. Create a layer that classifies each tract based on $PM_{2.5}$ level, distance from current measurement site, and population density to determine those that are high in all three
7. Determine overlap between tracts that are high in all three categories and existing ozone monitoring site locations that are not used in $PM_{2.5}$ monitoring

References:

[1]TCEQ. *Air Monitoring Sites.* http://www.tceq.texas.gov/airquality/airmod/data/hgb8h2/hgb8h2_site.html

[2]EPA. *National Ambient Air Quality Standards*. http://www.epa.gov/air/criteria.html

[3]Pope CA, DV Bates, MA Raizenne. *Health Effects of Particulate Air Pollution: Time for Reassessment?*. Environmental Health Perspectives. Volume 103, Number 5, May 1995.

[4]http://www.esri.com/data/download/census2000-tigerline/index.html