


AERMOD/AERMET Met Data Issues

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AERMOD Sensitivity Analysis

- Varied Surface Characteristics:
 - Albedo Test: $\alpha=0.1-0.6$ ($B_o=1.0$, $z_o=0.1$)
 - Bowen Ratio Test: $B_o=0.1-10$ ($\alpha=0.2$, $z_o=0.1$)
 - Surface Roughness Test: $z_o=0.001-1.3\text{m}$ ($\alpha=0.2$, $B_o=1.0$)
- Varied Stack Heights and Buoyancy
 - 5, 10, 15, 20, 25, 30, 50, 75, 100, 150, 200m non-buoyant
 - 100, 150, 200m very buoyant (VB)

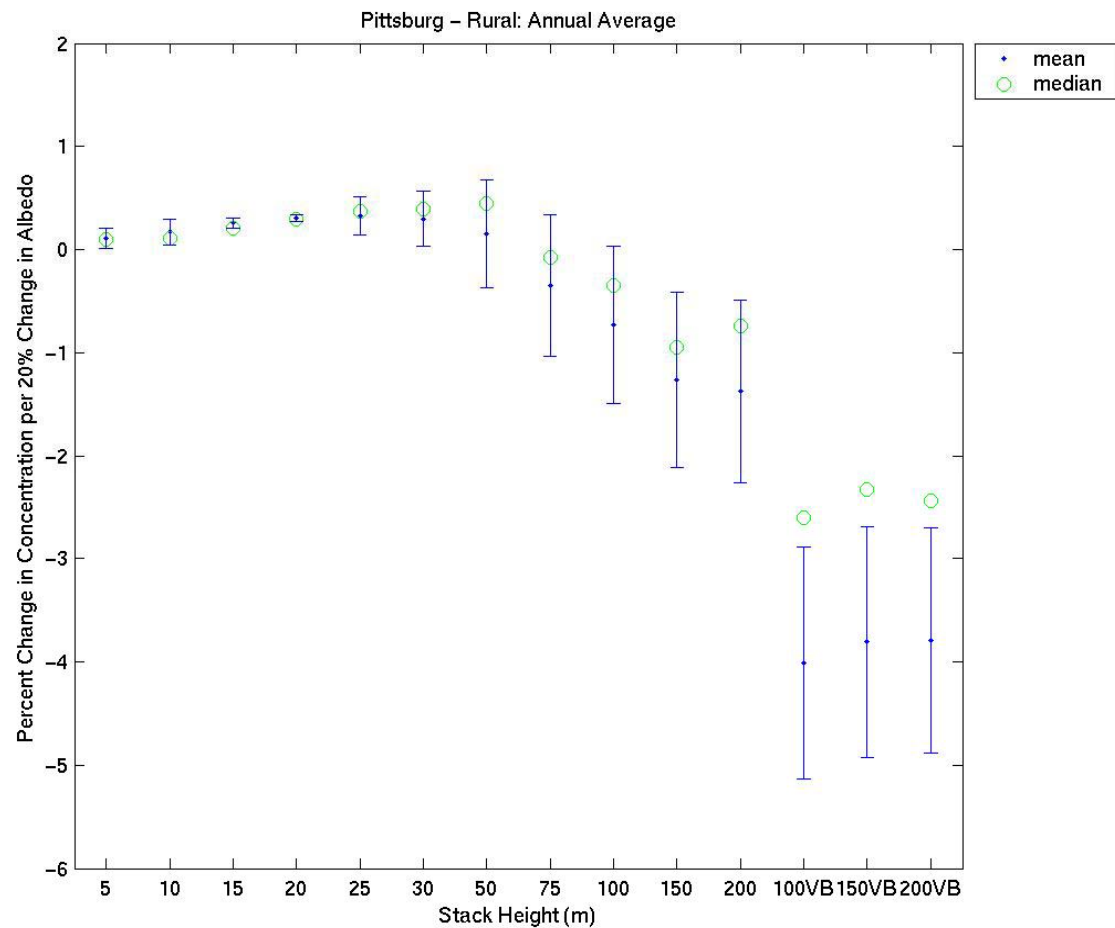
AERMOD Sensitivity Analysis

- Two meteorology sites:
 - Pittsburgh
 - Oklahoma City
- Rural and Urban (population=2.4 million)
- 24-hr and Annual averages

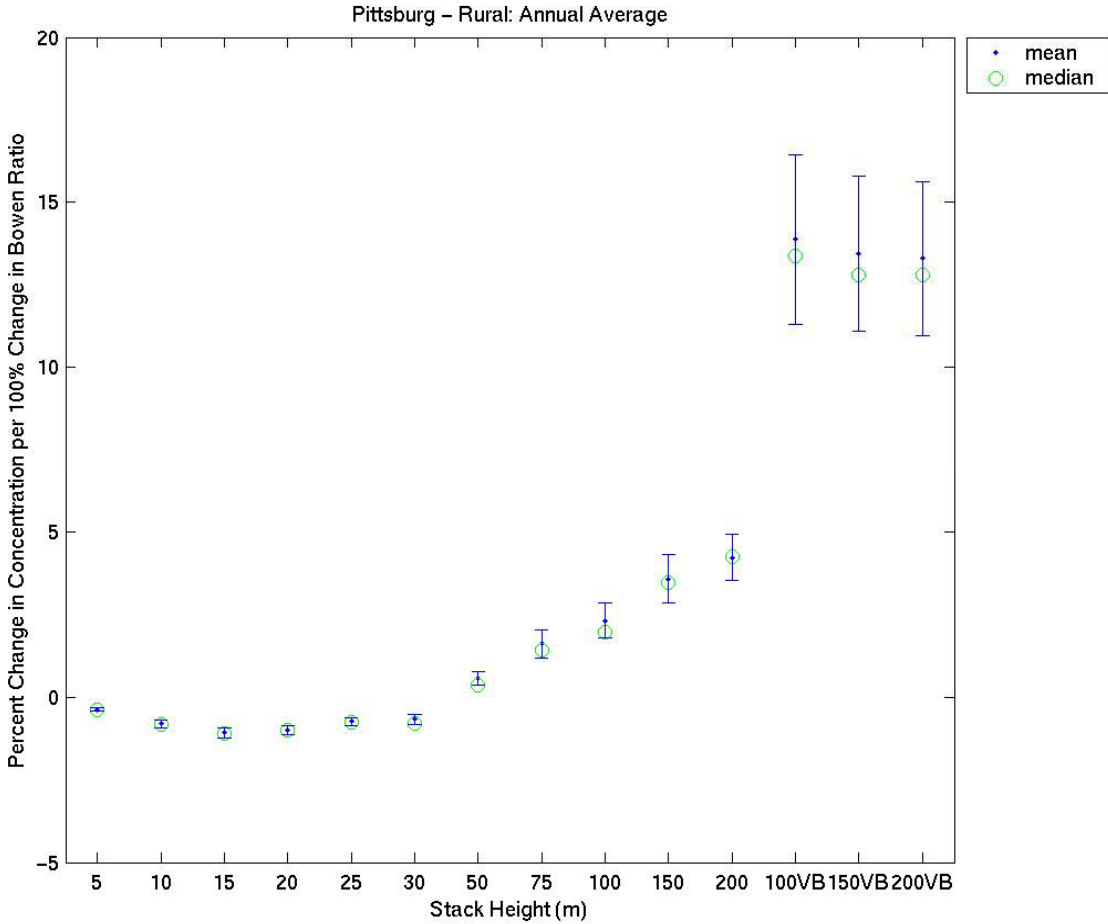
AERMOD Sensitivity Analysis

- Changes in albedo and Bowen ratio affect convective turbulence
 - ↓ Albedo → ↑ Convective turbulence
 - ↑ Bowen ratio → ↑ Convective turbulence
- Changes in surface roughness affect mechanical turbulence
 - ↑ Surface roughness → ↑ Mechanical turbulence

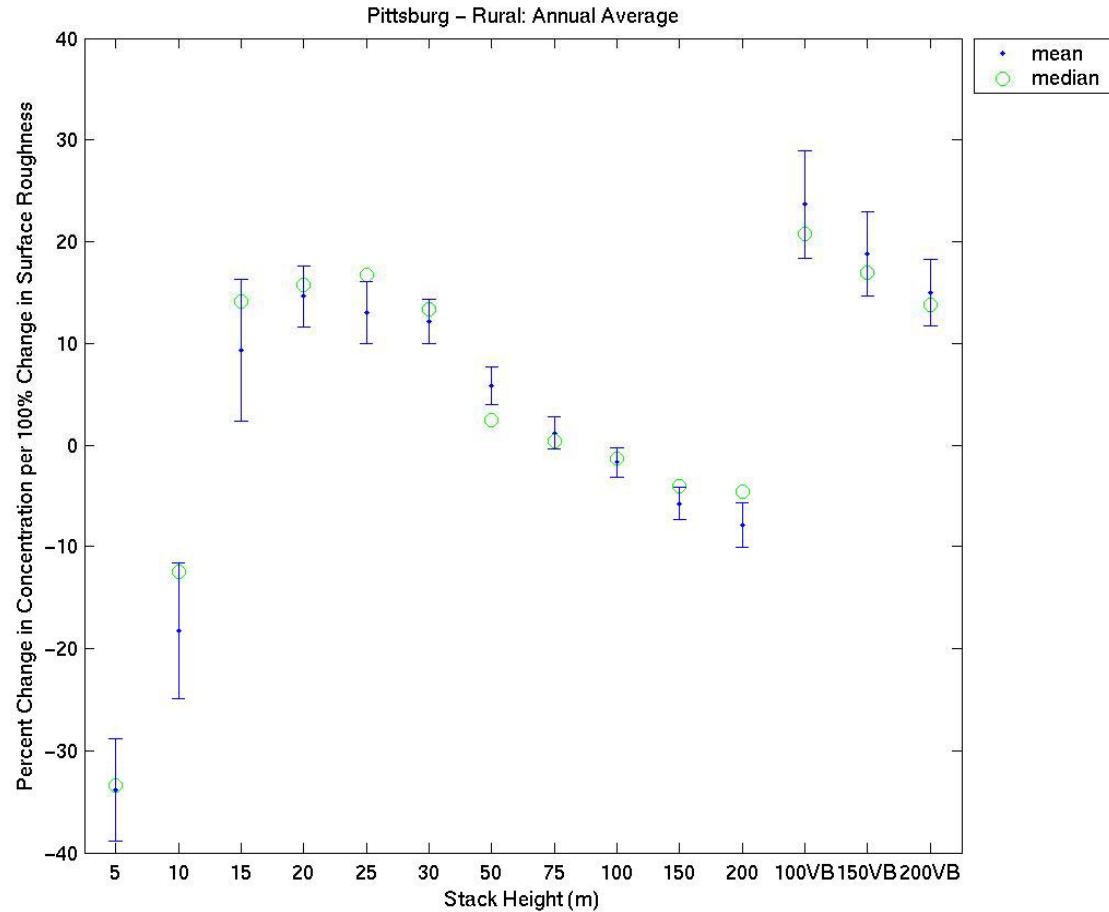
Albedo – Normalized Percent Differences



Bowen Ratio – Normalized Percent Differences



Surface Roughness – Normalized Percent Differences



Sensitivity Analysis Conclusions

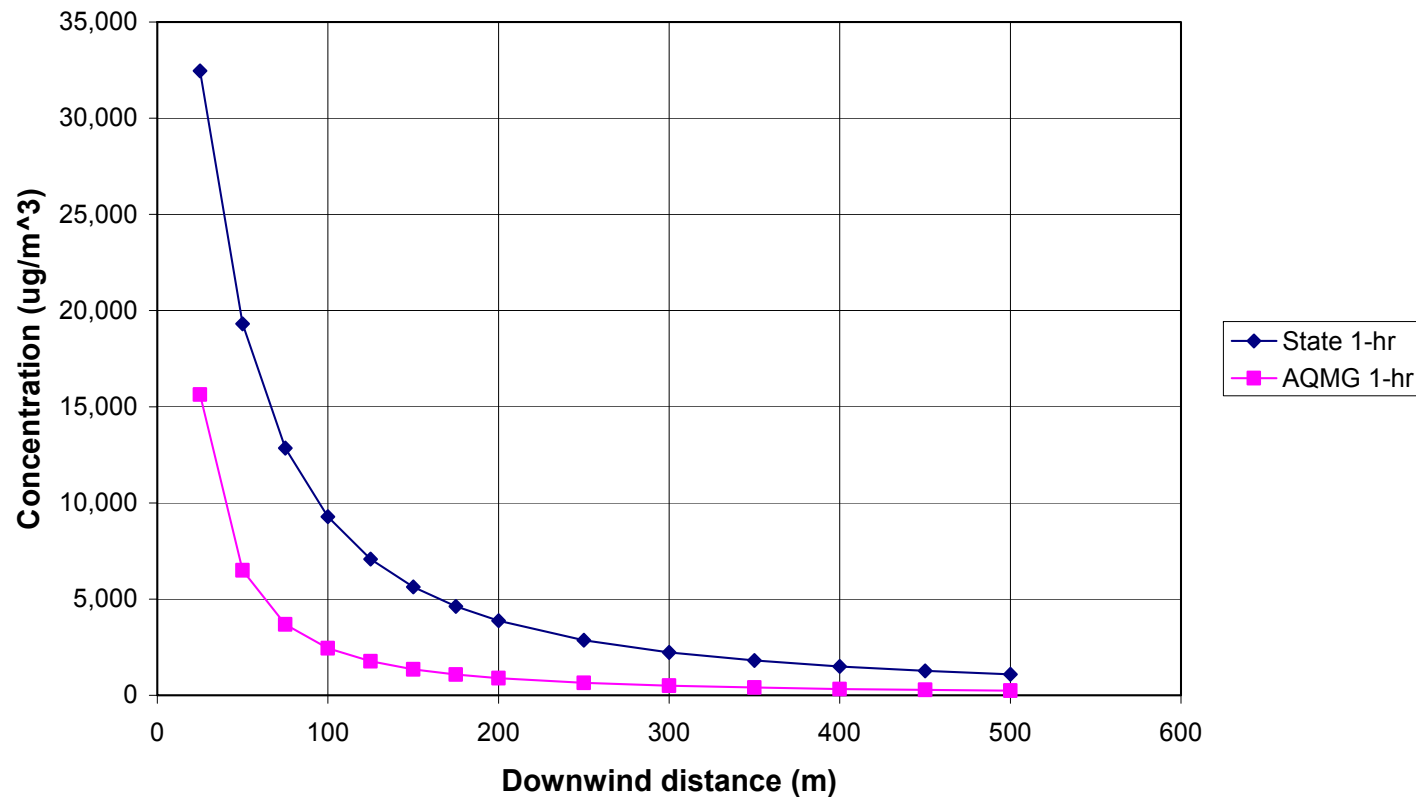
- AERMOD is most sensitive to changes in z_0 for low-level releases
 - This is due to the impact of changes in z_0 on mechanical turbulence:
 - ↑ Surface roughness will ↑ Mechanical turbulence
- Some sensitivity to changes in albedo and Bowen ratio, especially for taller, more buoyant stacks
 - Lower albedo or higher Bowen ratio will increase convective turbulence and bring plume down quicker

AERMOD Sensitivity Example

- Ground-level volume source based on “haul road” example
- Meteorological data based on two sets of surface characteristics:
 - State-processed data with $z_o=0.01\text{m}$, $\alpha = 0.6$, $B_o= 1.5$
 - AQMG-processed data with $z_o=0.1\text{m}$, $\alpha =0.16$, $B_o= 0.8$
- State surface characteristics based on literal interpretation of look-up tables for winter, which assume continuous snow cover

Sensitivity Example Results – 1hr

AERMOD Comparisons - Ground-level Volume Source
1-hr Concentrations for "State Met" vs. "AQMG Met"



Sensitivity Example Results – 24hr

AERMOD Comparisons - Ground-level Volume Source
24-hr Concentrations for "State Met" vs. "AQMG Met"

