

Mapping PM_{2.5} – Methods and Uncertainties

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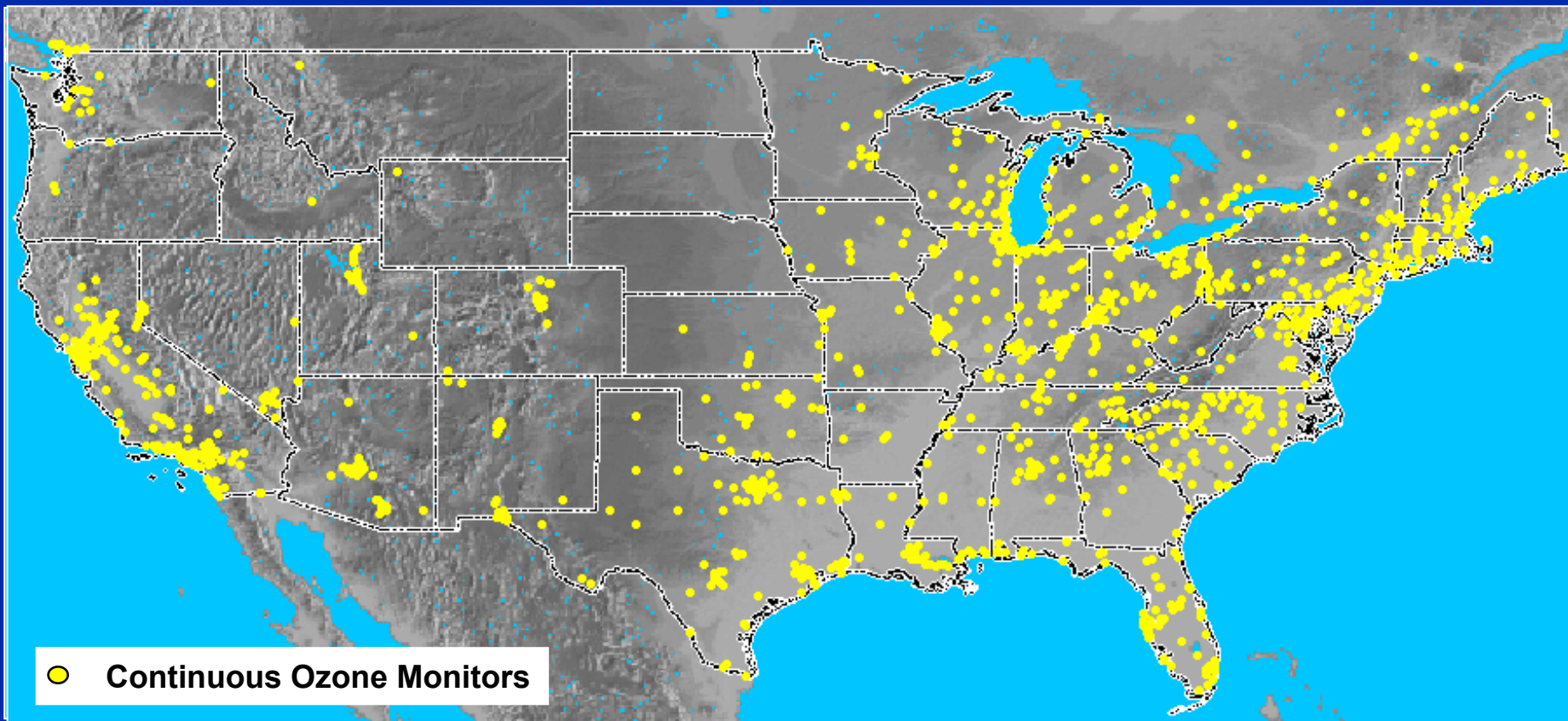
U.S. EPA National Air Quality Conference:
It's Not Just About Ozone Anymore
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Overview

- Mapping issues
- Uncertainty analysis of common mapping methods
- A method to improve $PM_{2.5}$ mapping
- Understanding $PM_{2.5}$ characteristics can improve mapping
- Alternative displays of $PM_{2.5}$ data

Mapping Issues (1 of 2)

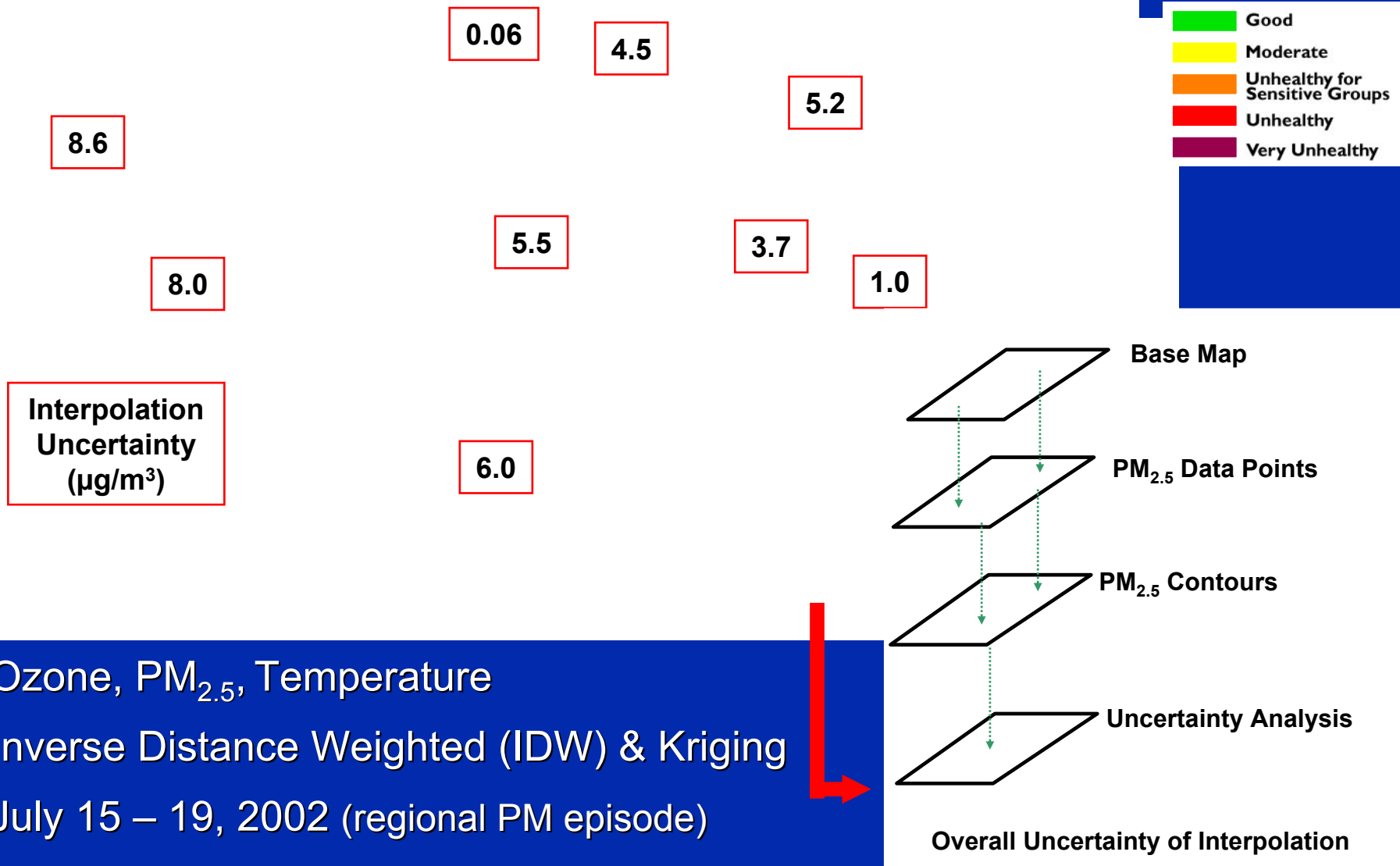
- Limited number of continuous $PM_{2.5}$ monitors in the U.S.



Mapping Issues (2 of 2)

- $PM_{2.5}$ is a regional *and* local pollutant
- $PM_{2.5}$ characteristics vary from region to region (e.g. urban vs. rural)
- Varying terrain and seasonal characteristics also affect consistency of mapping

Uncertainty Analysis - Mapping



Uncertainty Analysis - Results

Summary of IDW results:

<i>Parameter</i>	<i>RMSE*</i>	<i>Uncertainty (%)</i>
Temp	2 - 3 °F	2 - 3
Ozone	6 - 10 ppb	8 - 10
PM _{2.5}	4 - 12 µg/m ³	10 - 20

Summary of kriging results:

<i>Parameter</i>	<i>RMSE*</i>	<i>Uncertainty (%)</i>
Ozone	5 - 10 ppb	8 - 10
PM _{2.5}	4 - 7.5 µg/m ³	10 - 15

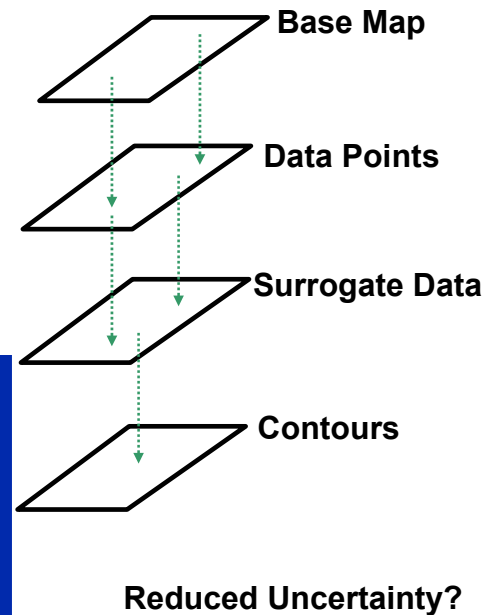
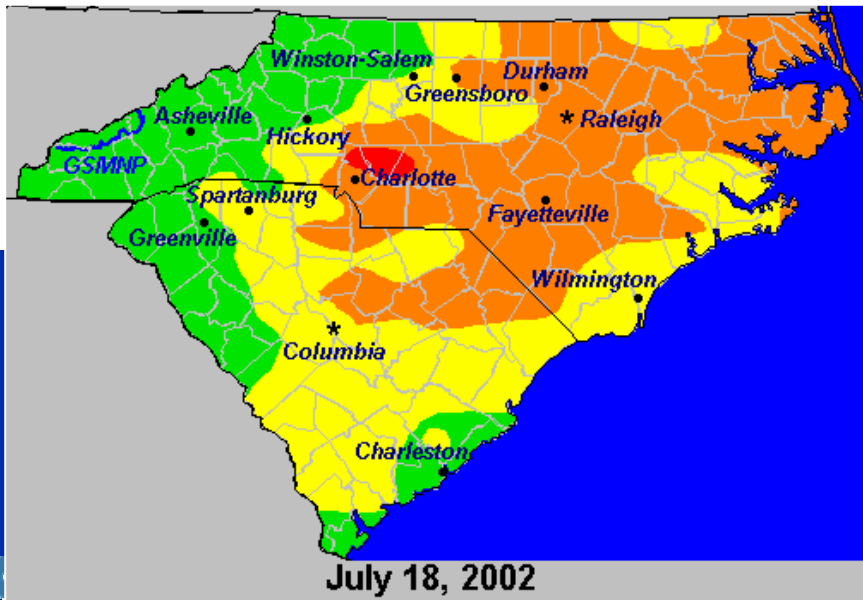
*RMSE = Root Mean Square Error

A Method to Improve PM_{2.5} Mapping

Cokriging: surrogate data used to augment spatial coverage of PM_{2.5} monitors:

- visibility data as a mapping surrogate
- population density or urban boundaries as surrogates
- topography to define regions of influence

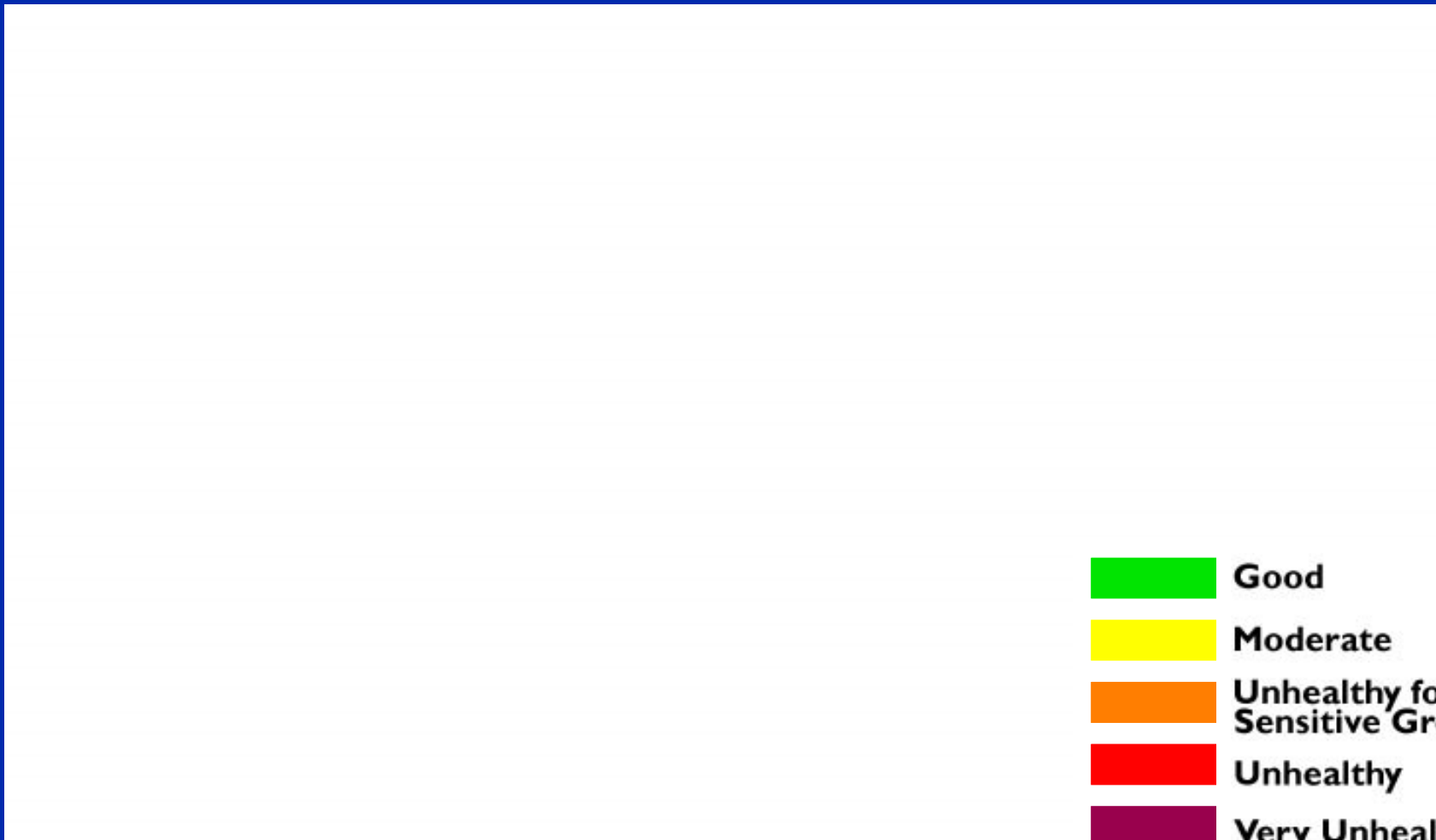
Example - Cokriging



Understanding the Characteristics of PM_{2.5}

- A better understanding of PM_{2.5} by region is needed to improve mapping results
- Explore relationships with possible surrogate data sets
 - ASOS visibility data, satellite data, digital elevation data, etc.

Alternative Displays of PM_{2.5} Data



PM_{2.5} AQI Values by County