Impact of Control Strategy Modeling at Varying Horizontal Scales

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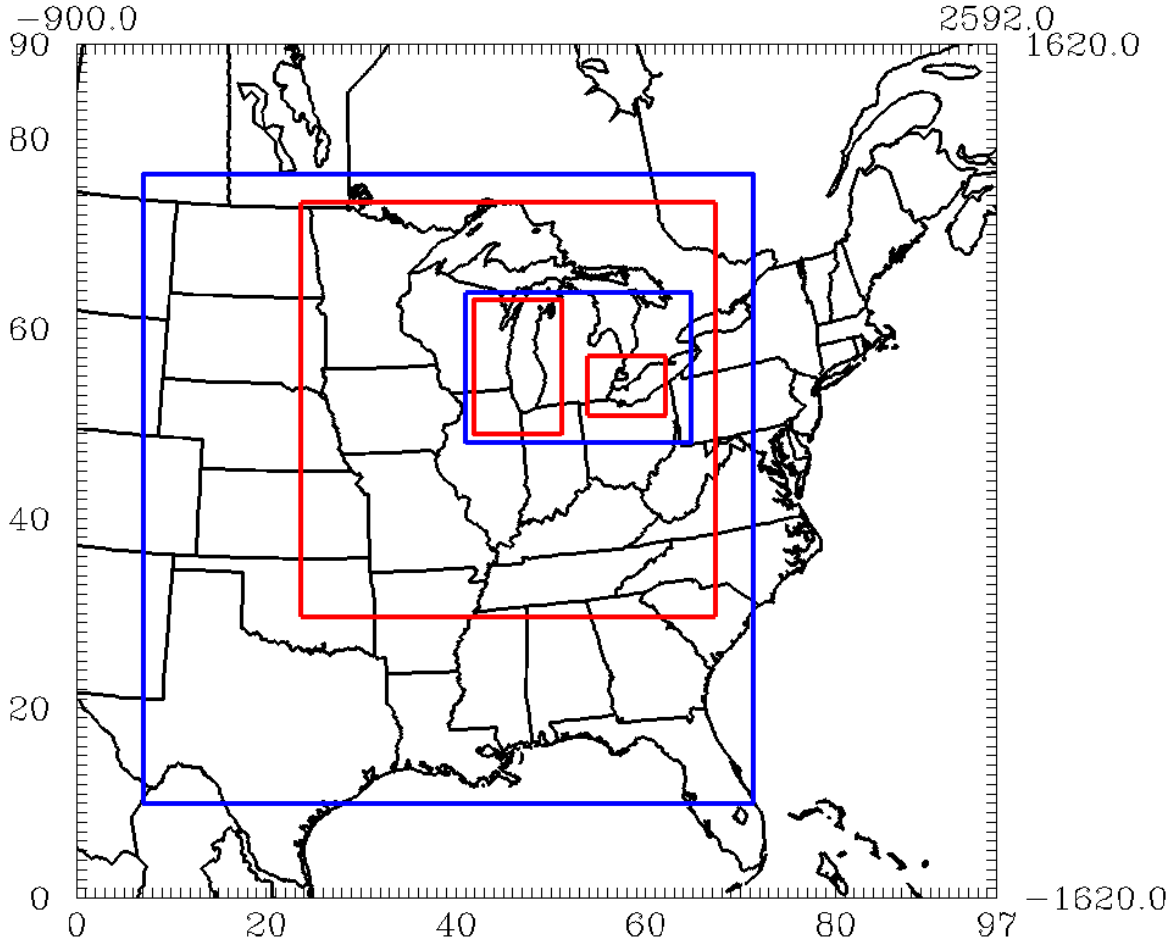
Motivation

Stakeholder group interested in the role grid spacing could have on CAMx future design value and emission control response.

Study Phases

1. Develop 4km MM5 fields as “nestdown” from 12km Midwest RPO MM5.
2. Generate new motor vehicle emissions on 4km grid for 2002 and 2018
3. Generate new point source emissions for 2018
4. Compare ozone response with and without 4km nest

Modeling Domains



MRPO 36km 4RPO CAMx Domain

Red 12km and 4km MM5 Domains

Blue 12km and 4km MM5 Domains

Modeling Period

Jun-Aug 2002

4km MM5 Performance Evaluation

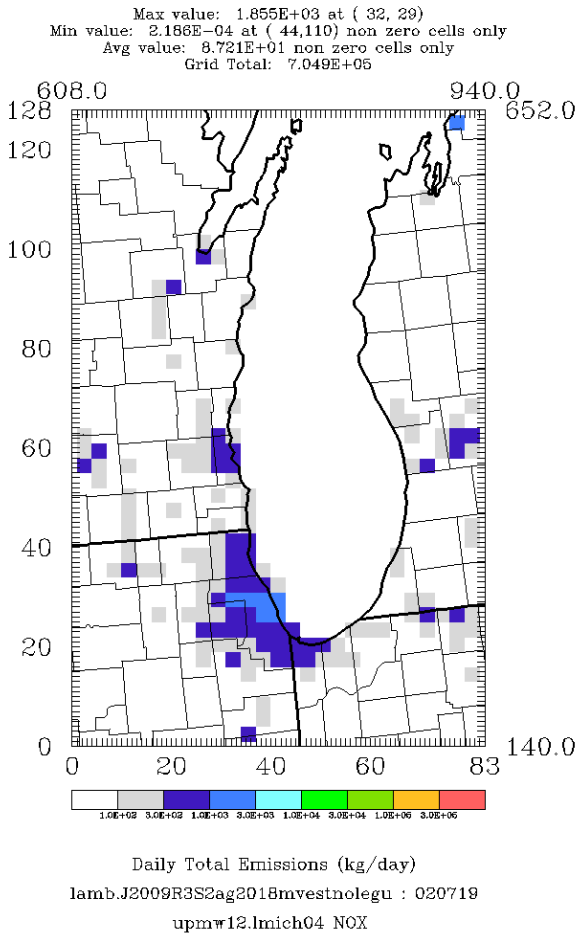
Temperature

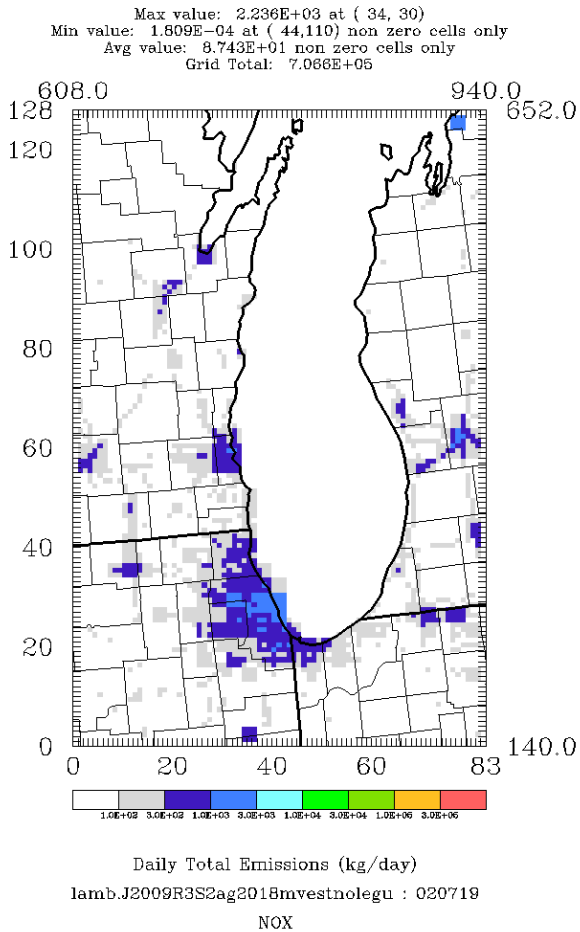
- Bias 0.81 K (Target: 0.5K)
- Error 2.1 K (Target: 2.0 K)

Mixing Ratio

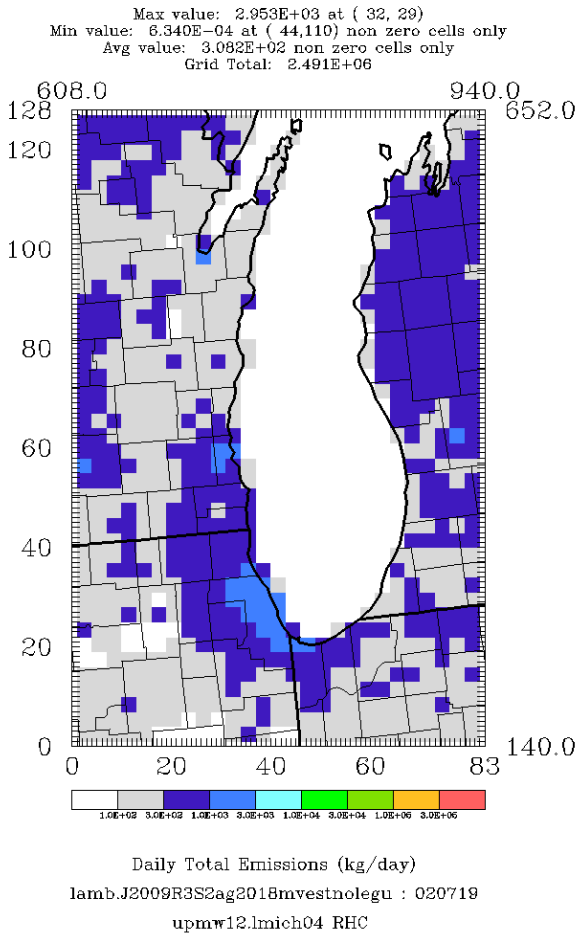
- Bias 0.14 g/kg (Target: 1 g/kg)
- Error 1.41 g/kg (Target: 2 g/kg)

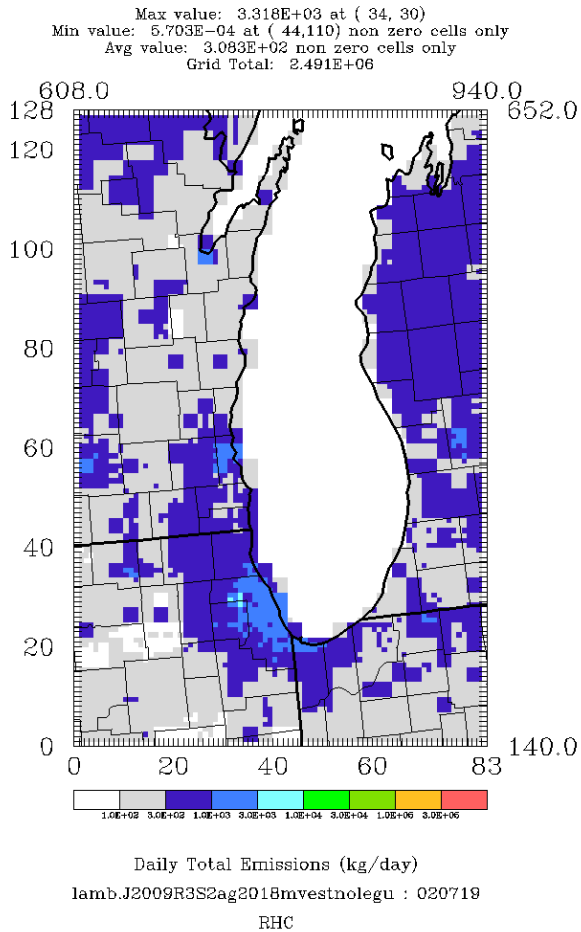
Low Level 2018 NOx Emissions



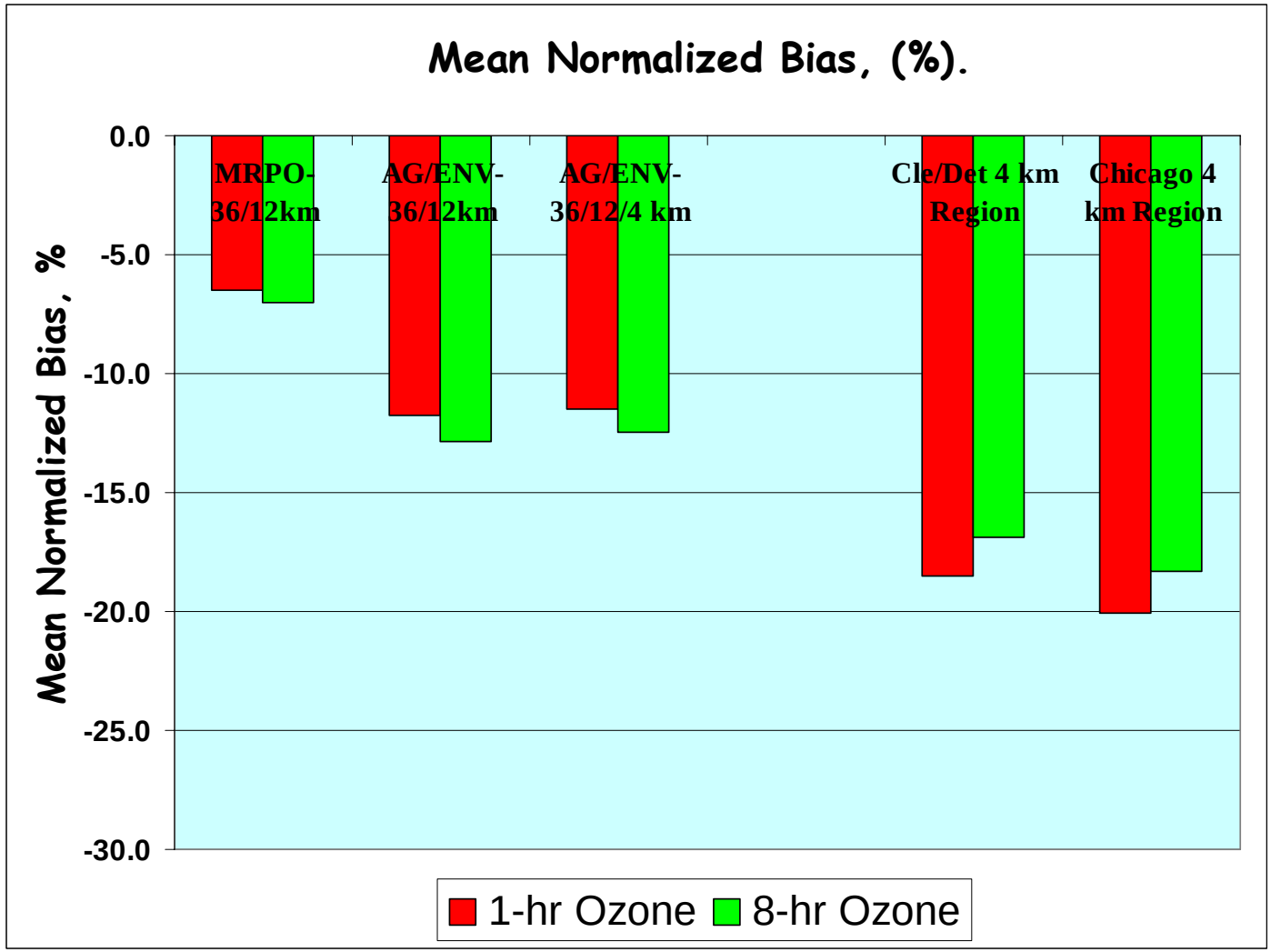


Low Level 2018 RHC Emissions

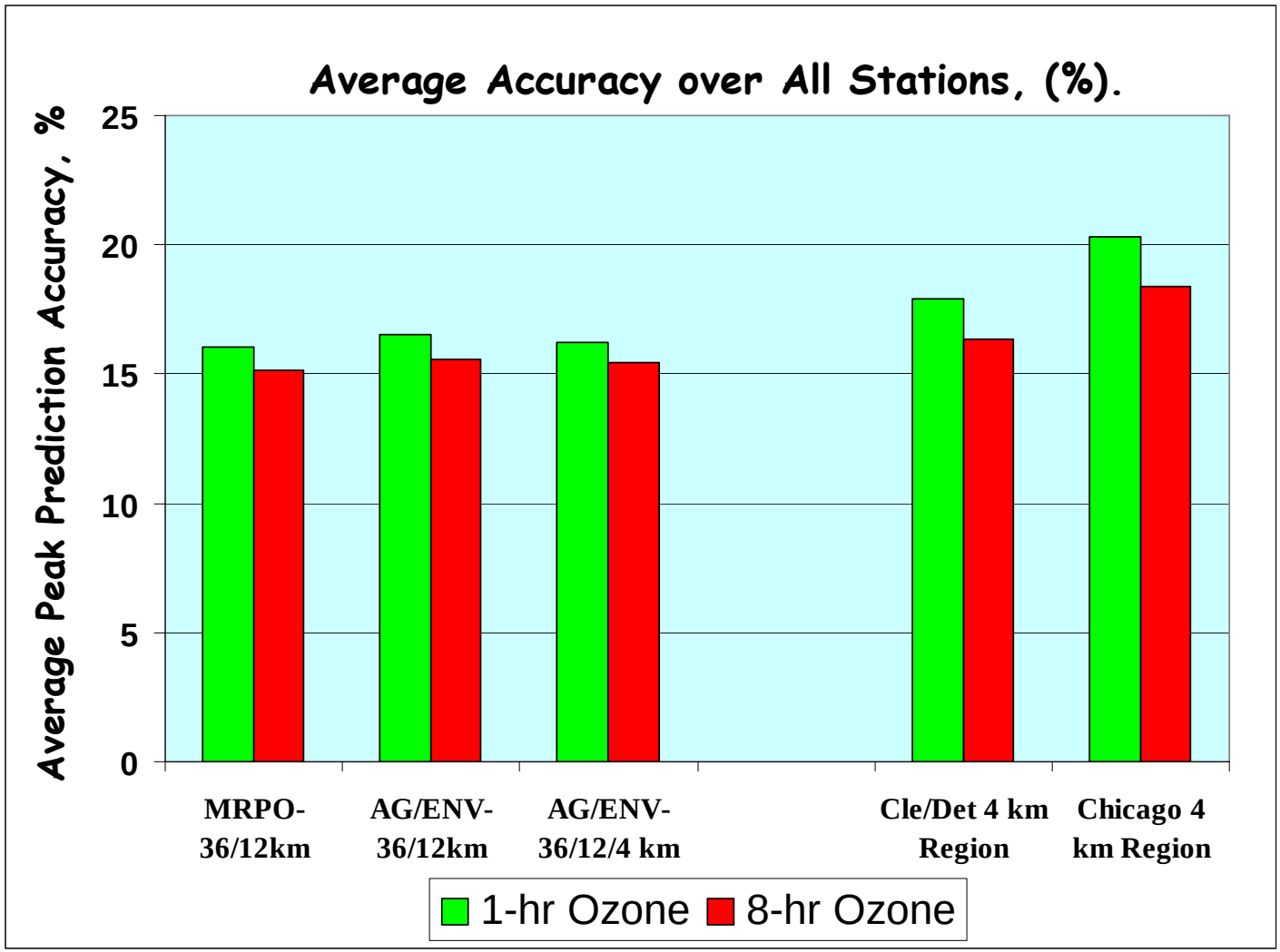




Model Performance



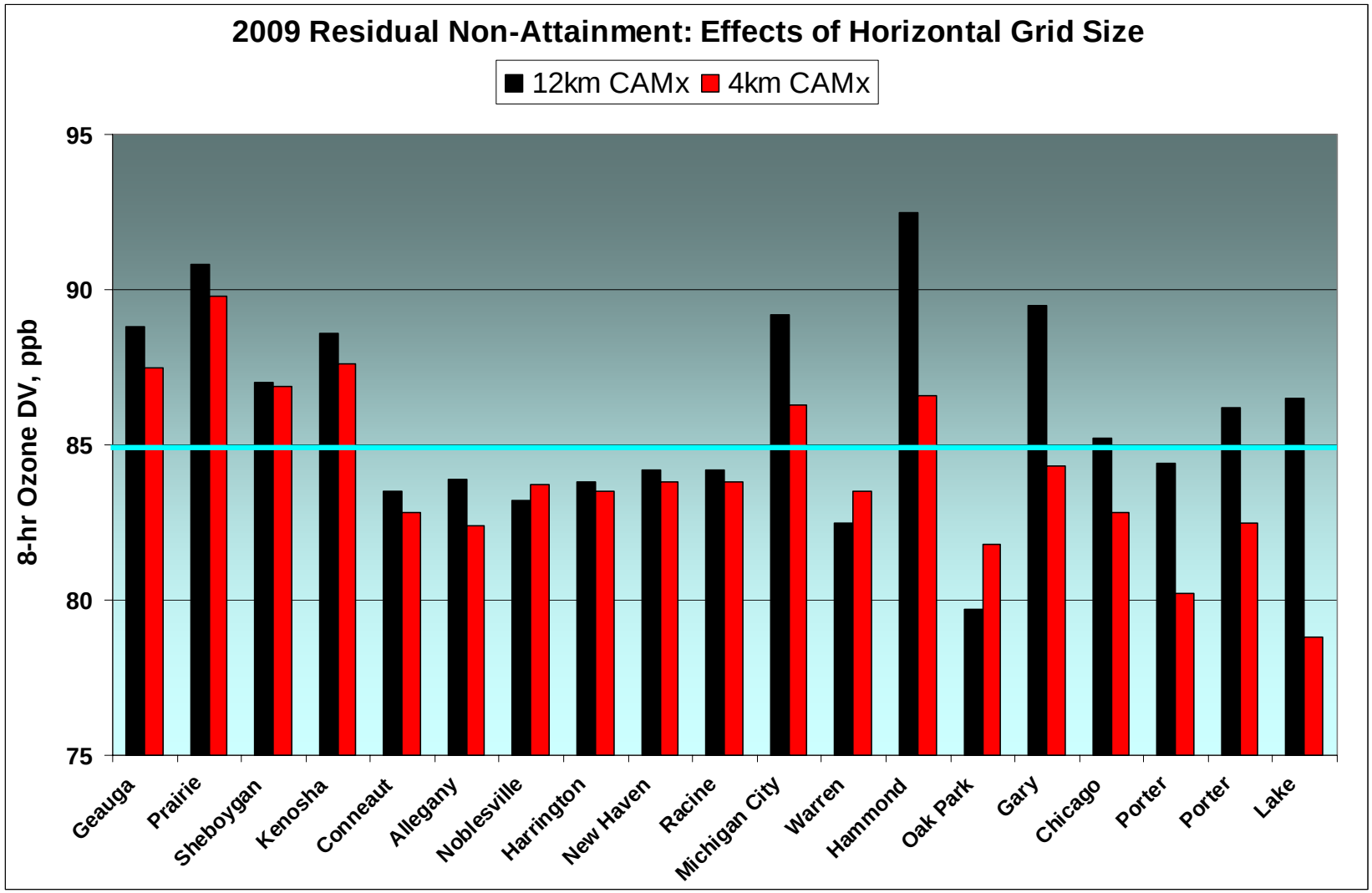
Model Performance



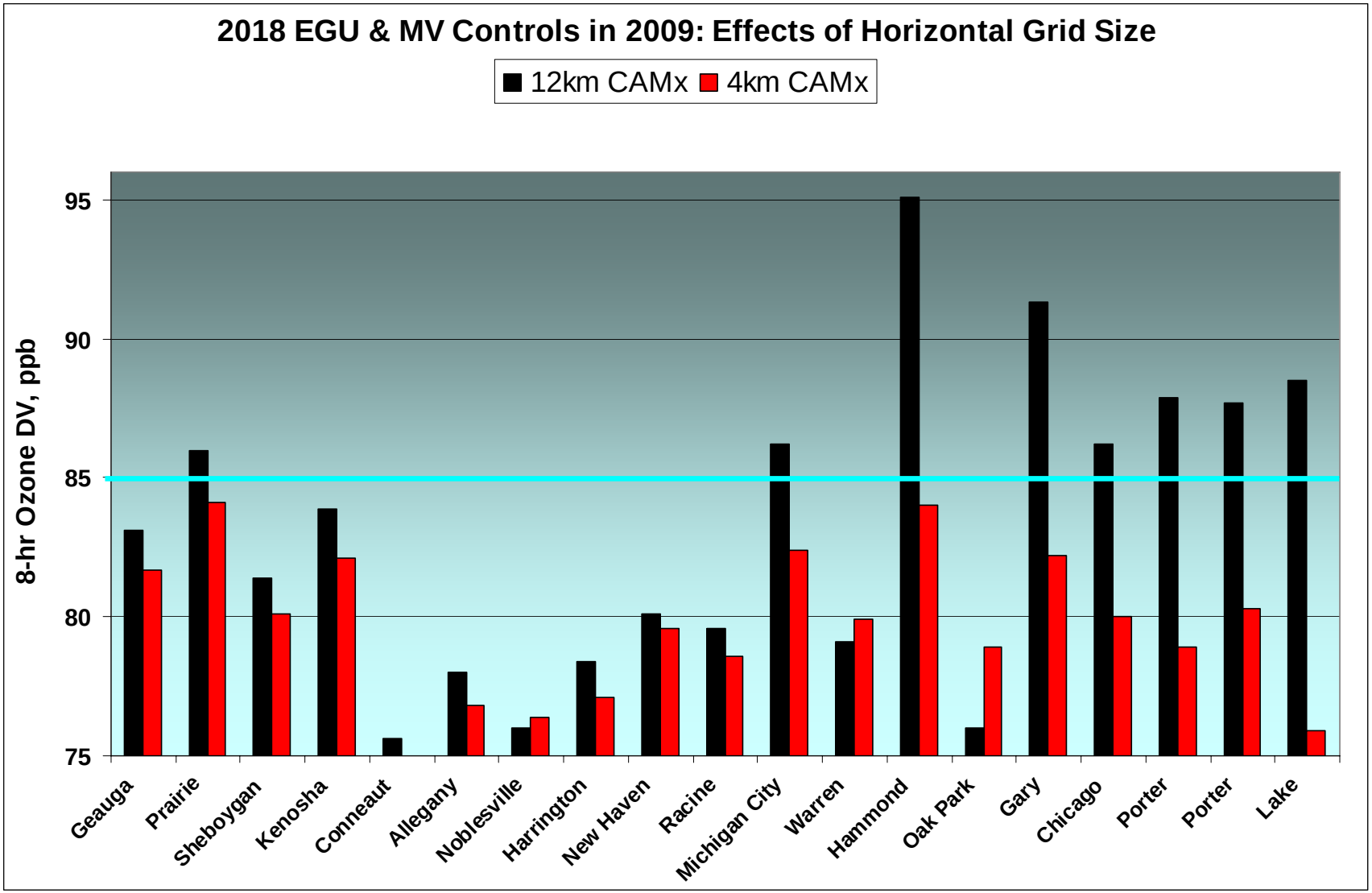
Model Performance

- Model Performance Generally Comparable
- Station by Station 12km vs 4km Performance not analyzed

Finer Grid Resolution Produces Lower 2009 8-hr Ozone Design Values



Finer Grid Resolution Produces Greater Ozone Control Effectiveness



Study Limitations

- No detailed comparison of 4km and 12km met. performed.
- Don’t know if CAMx response a function of met. or emissions/chemistry
- Local implications still under investigation; generality of results to other areas likewise uncertain
  - Largest response only in a portion of the domain (N.W. Indiana)