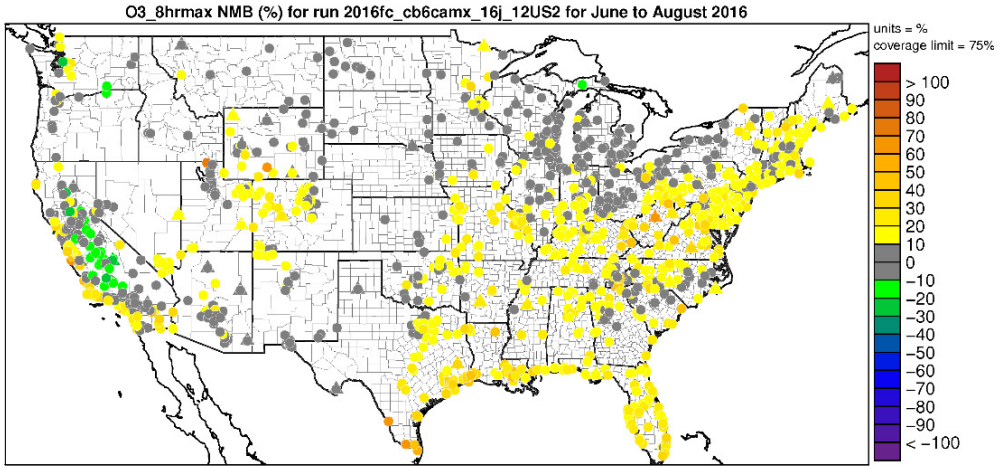
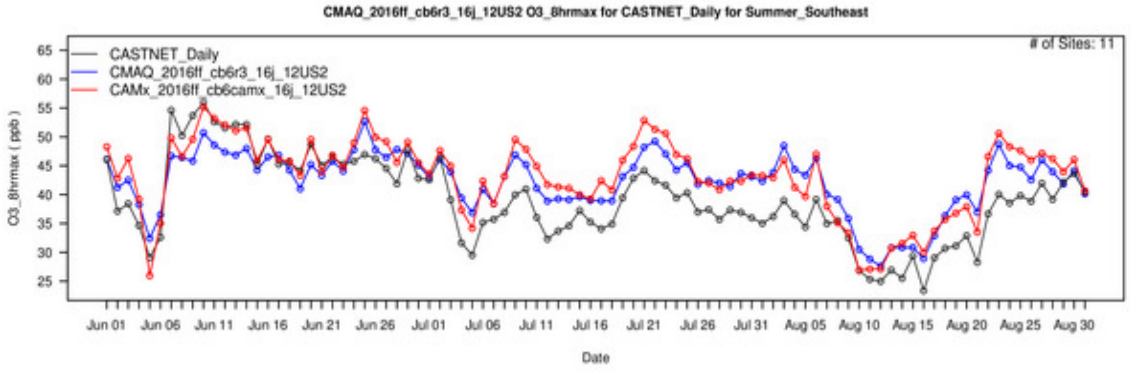
Model Evaluation Requires Credible and Comprehensive Measurement Data

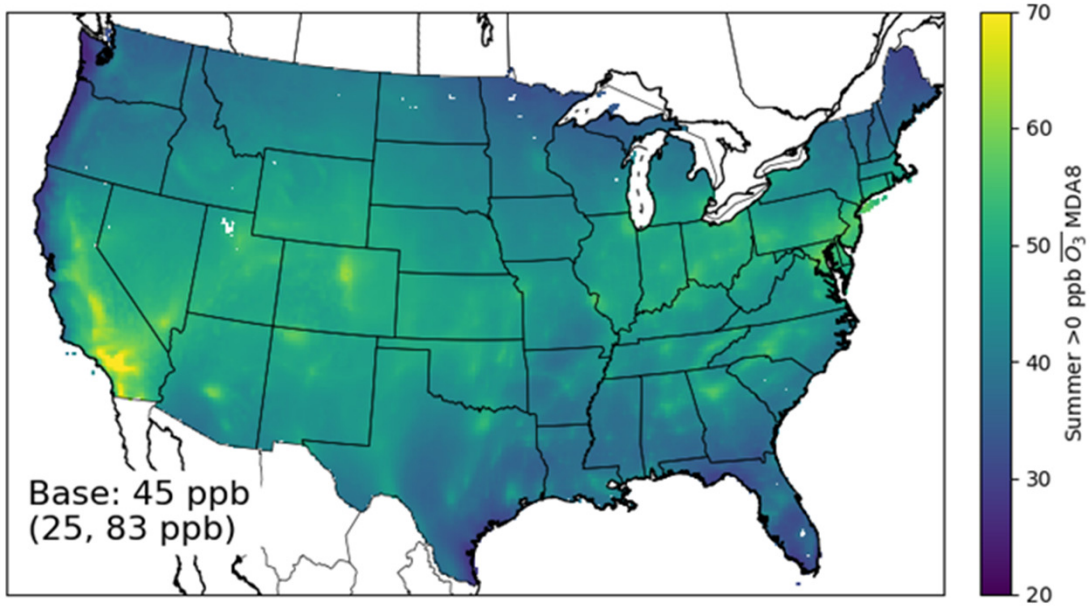
- Modeled and observed values are paired in space and time before calculating statistics (bias, error, correlation etc)
  - Typical model spatial resolution
    - Hemispheric simulation: 108 Km x 108 km
    - Contiguous US: 12 km x 12 km
    - Local studies: 4km x 4km
  - Model temporal resolution: hourly
- Having broad spatial and temporal measurement coverage is critical for comprehensive model evaluation
  - CASTNET monitors often provide ozone data in rural areas without state monitors.
- Understanding measurement limitations and uncertainties is critical context for model evaluations

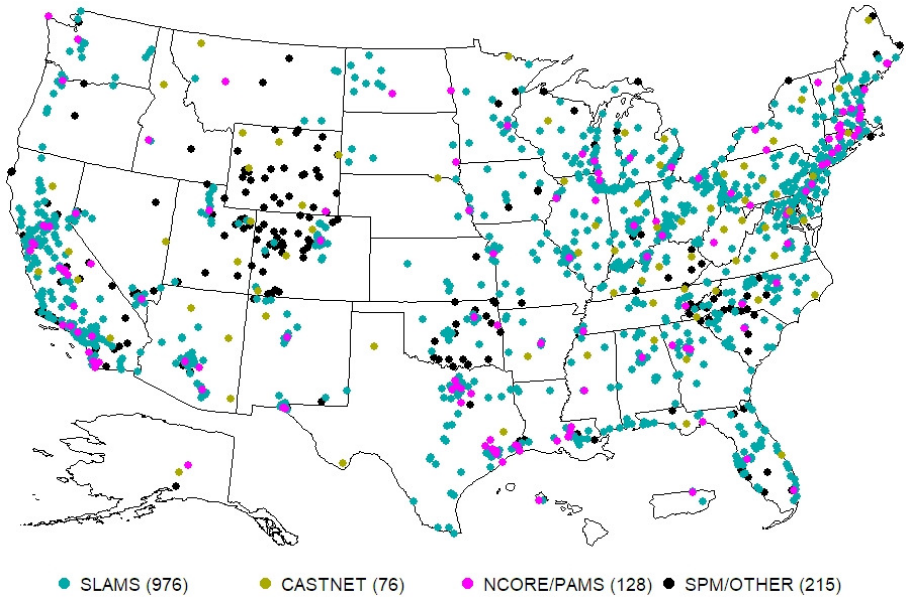




Importance of Adequate Monitoring Spatial Coverage

Model-predicted spatial gradients can not be evaluated explicitly for locations without monitors.

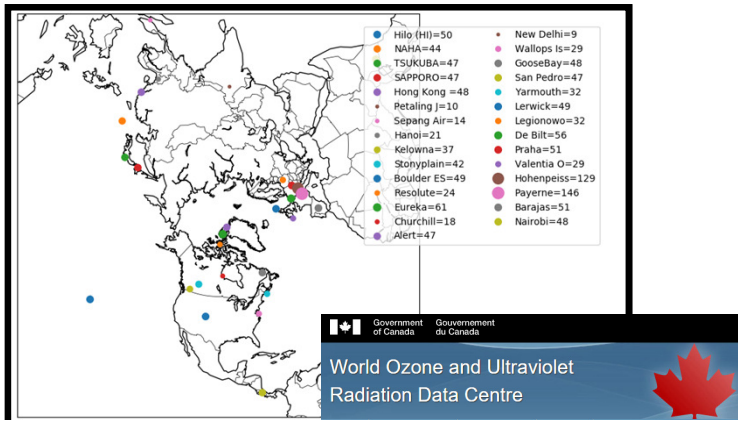




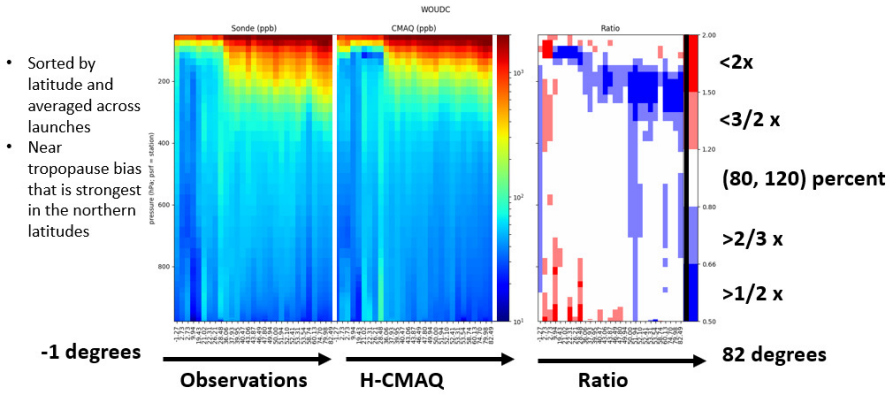
Plots courtesy of Barron Henderson and Ben Wells

"Wish List" for Monitoring Network Capabilities

- Broad spatial coverage in urban and rural locations
- Measurements of ozone, speciated PM and precursors (NOx, NOy, SO2, speciated VOCs)
- Long measurement with consistent instrumentation/methods for trends analysis
- For evaluating model treatment of important background and anthropogenic sources
  - **Vertical gradients** (on tall towers or sondes)
  - Spatial coverage in rural areas
  - Co-located measurements of O3, CO, RH, PM
- Vertically integrated column measurements for comparison with satellites
  - NO2 + HCHO (Pandora)
  - AOD



WOUDC Sondes: by Site (all Times)



- Sorted by latitude and averaged across launches
- Near tropopause bias that is strongest in the northern latitudes

Plots courtesy of Barron Henderson