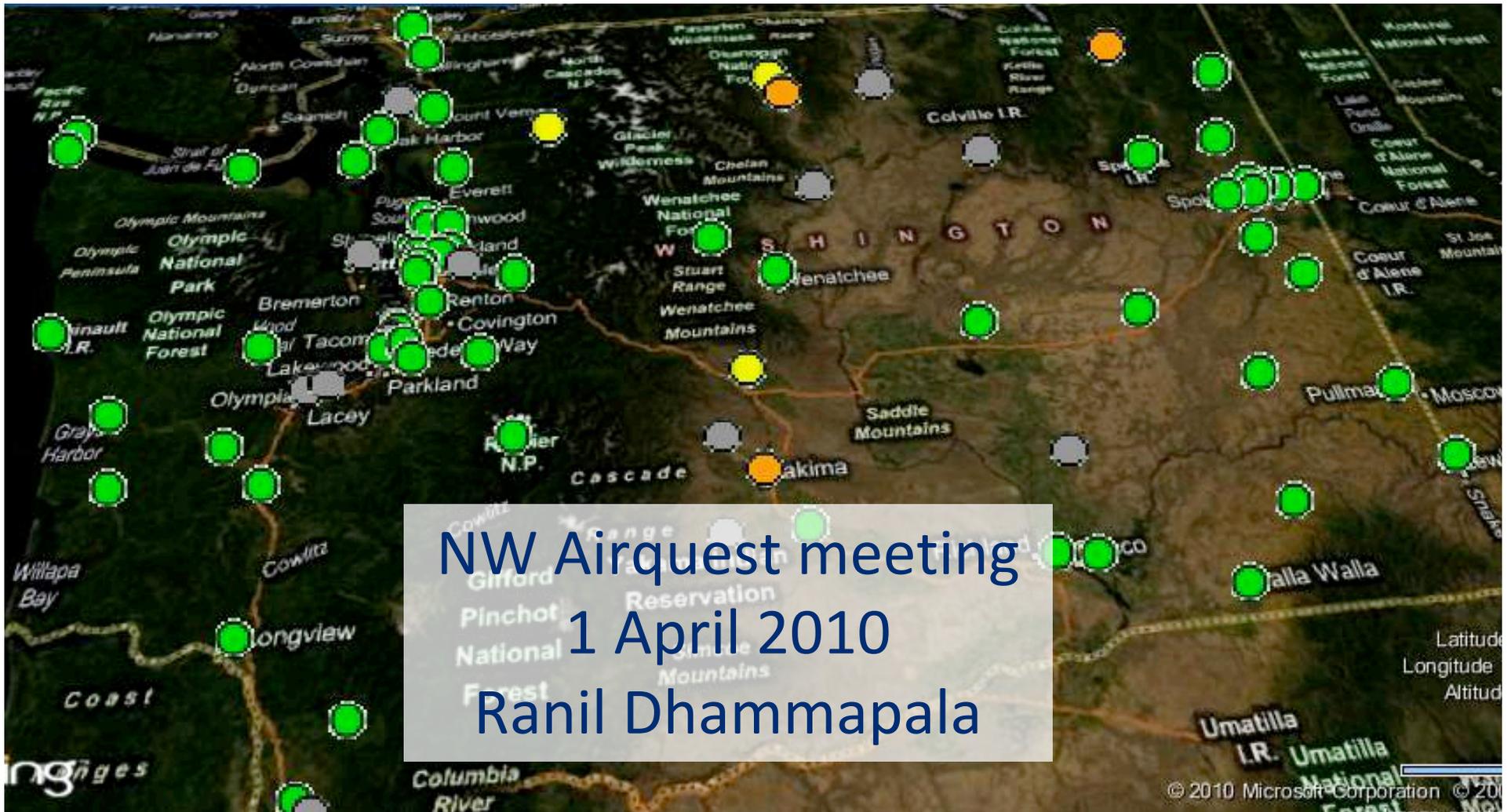


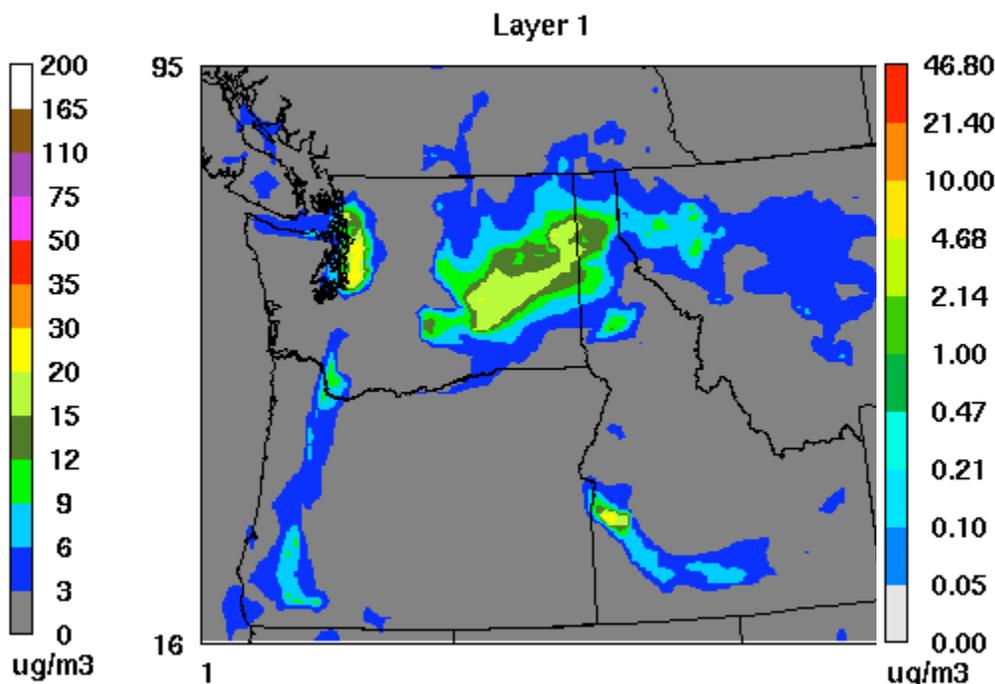
Analysis of nitrate in the Columbia Basin



Background

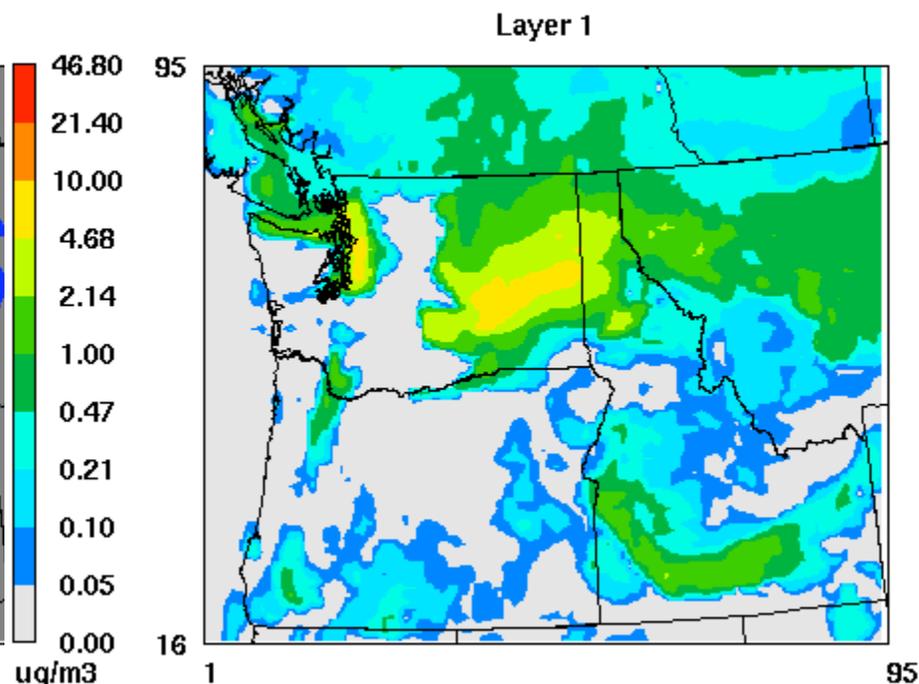
Noticed Airpact was often showing high fractions of aerosol nitrate in PM2.5, in the Columbia basin

CMAQ PM2.5



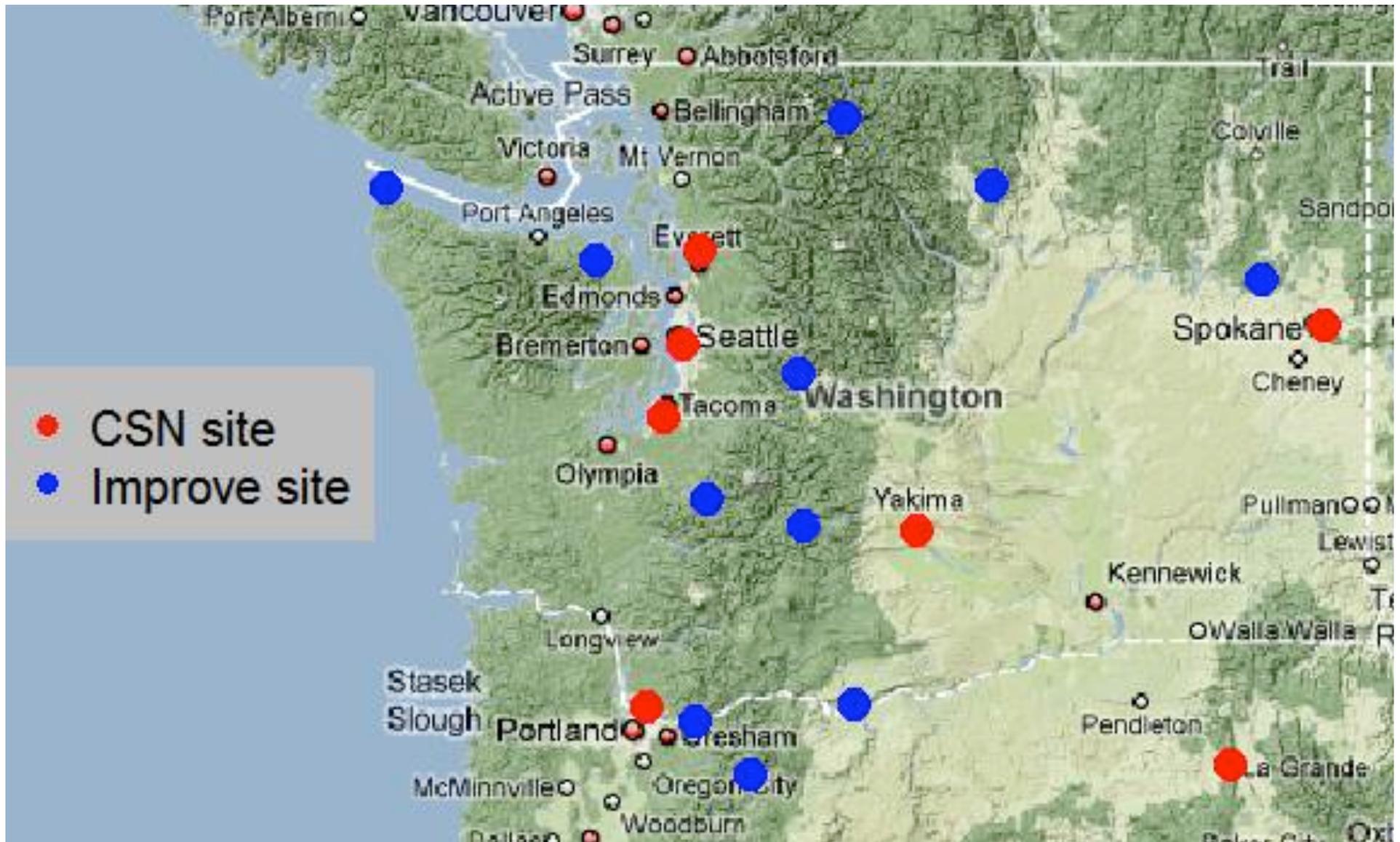
December 14,2009 3:00:00 (PST)
Min= 0 at (14,52), Max= 27 at (22,66)

CMAQ NO3

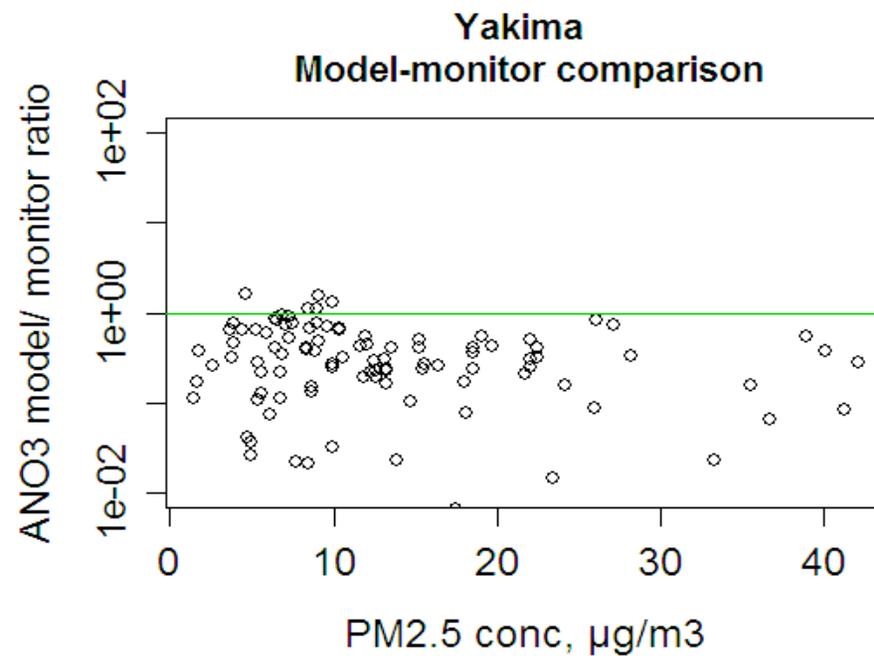
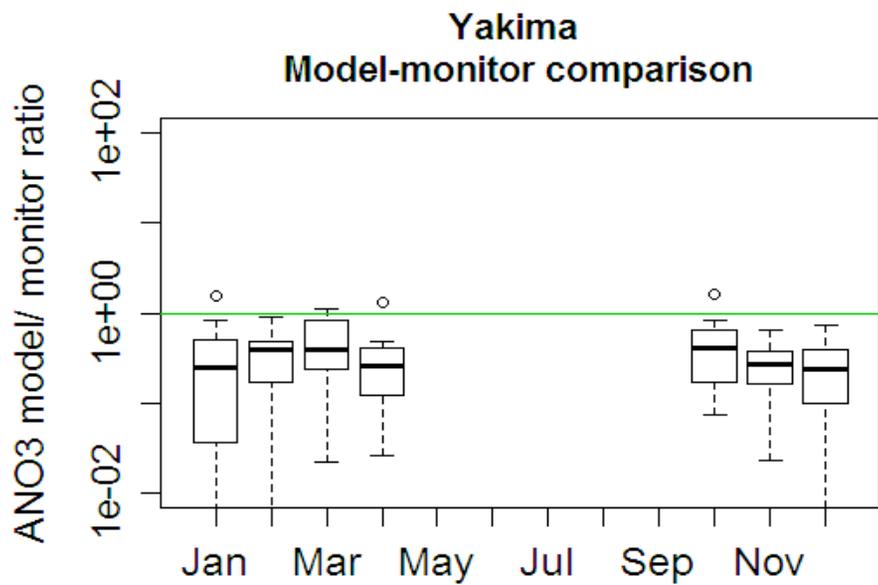
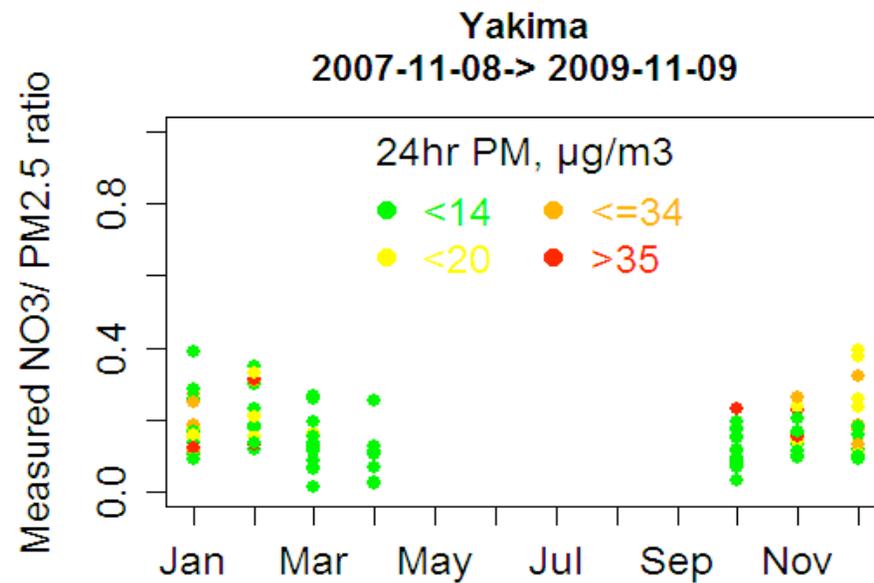
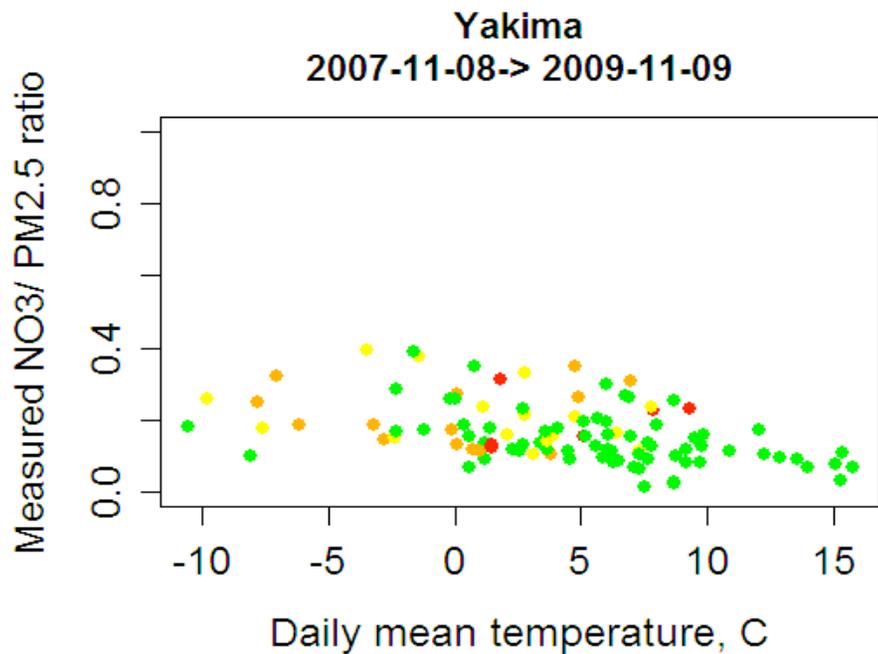


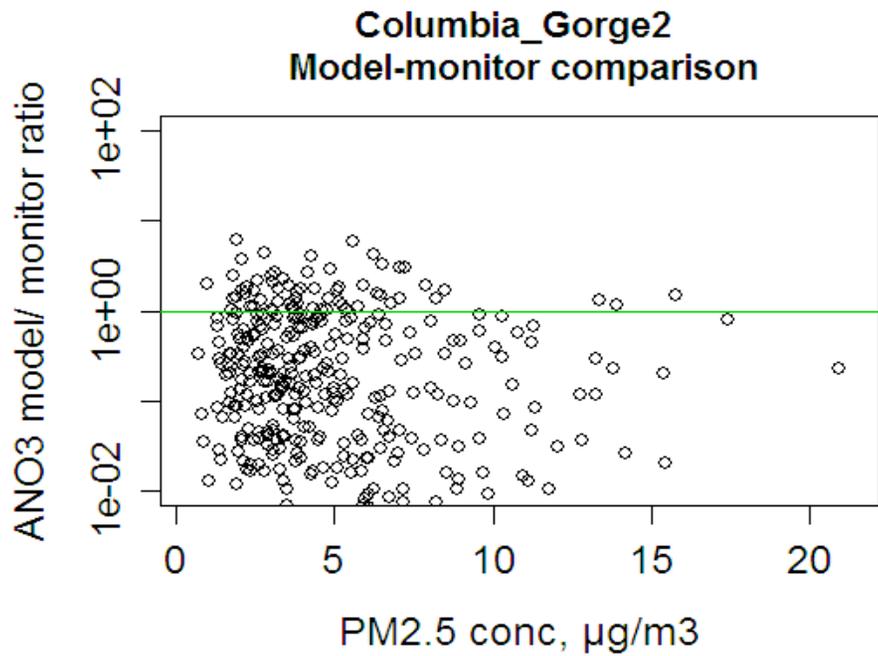
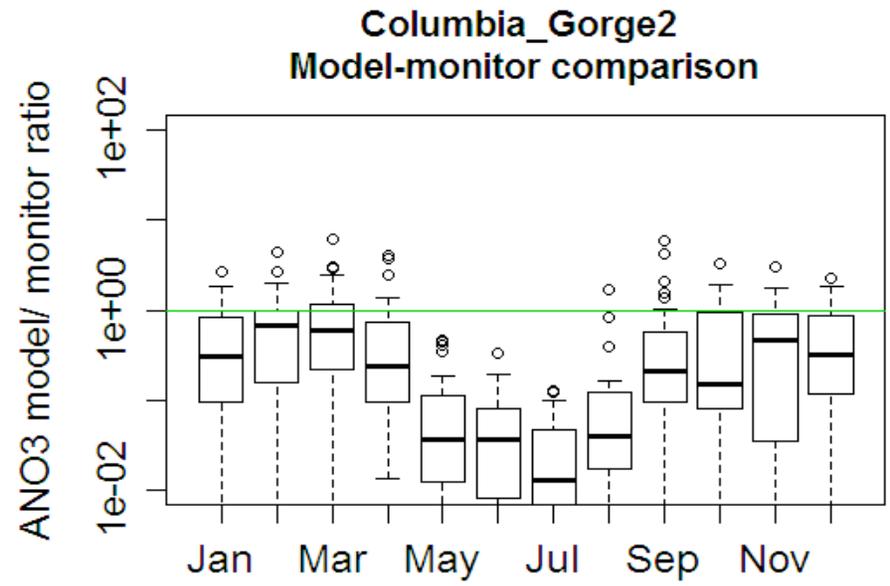
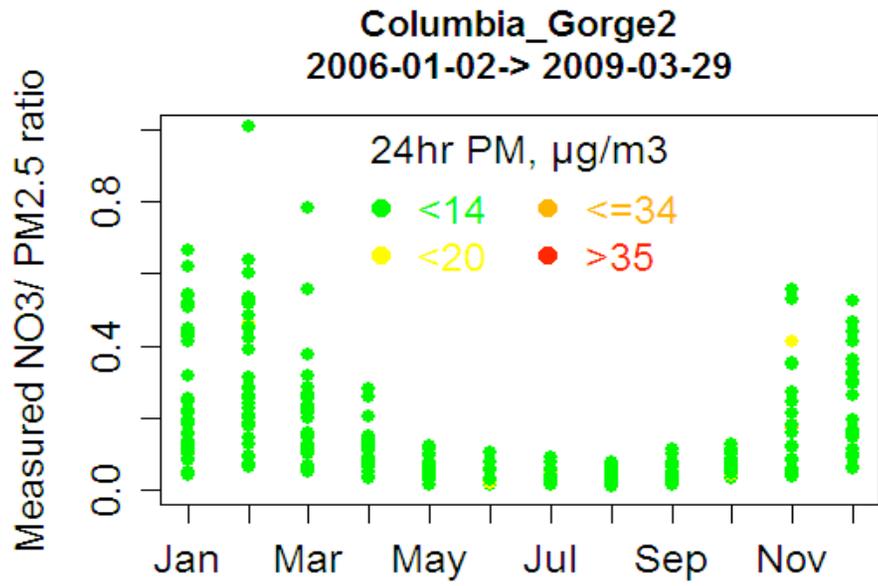
December 14,2009 3:00:00 (PST)
Min= 0.00 at (20,60), Max= 9.13 at (23,70)

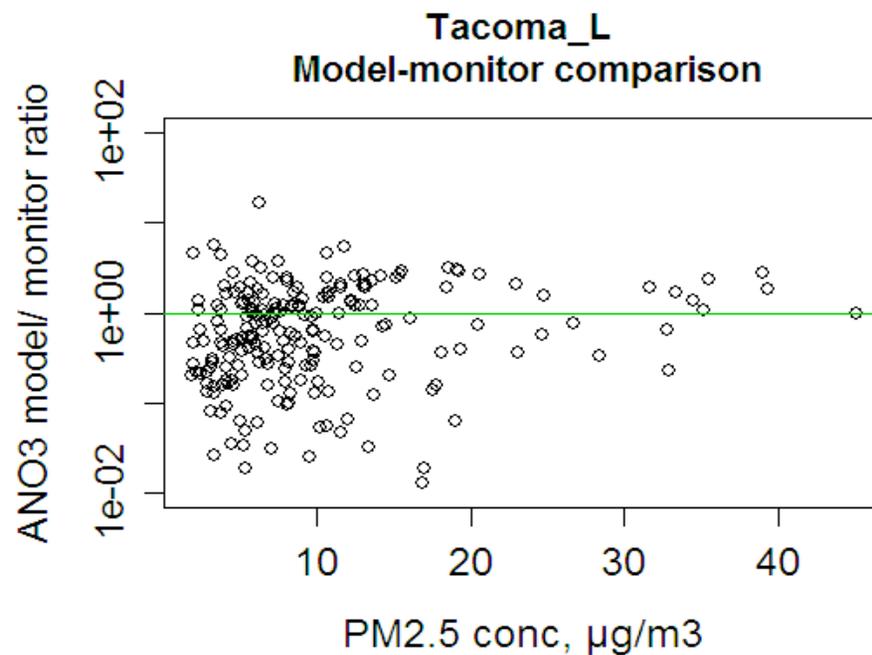
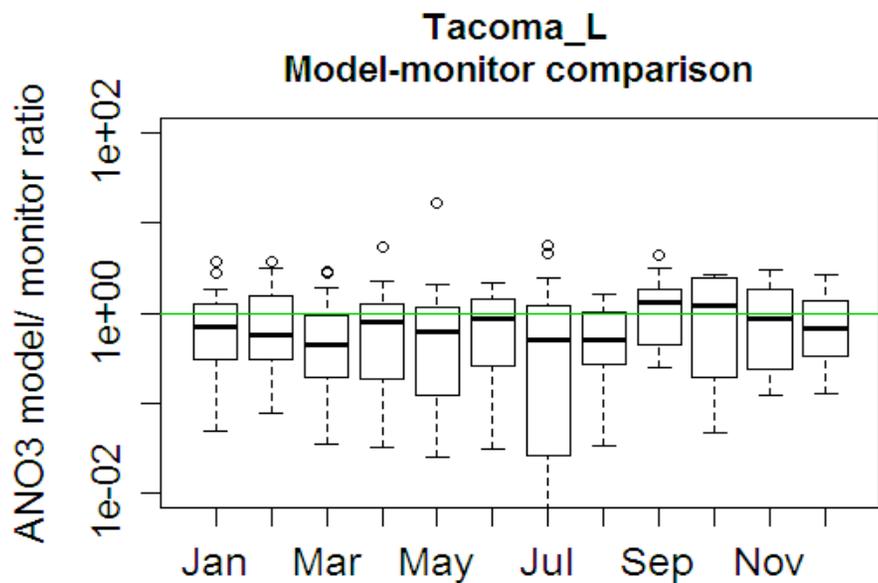
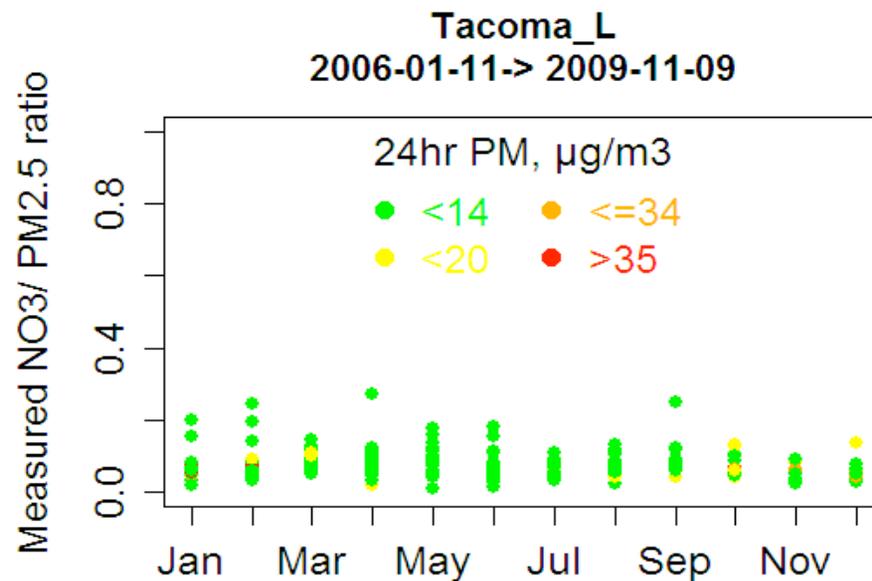
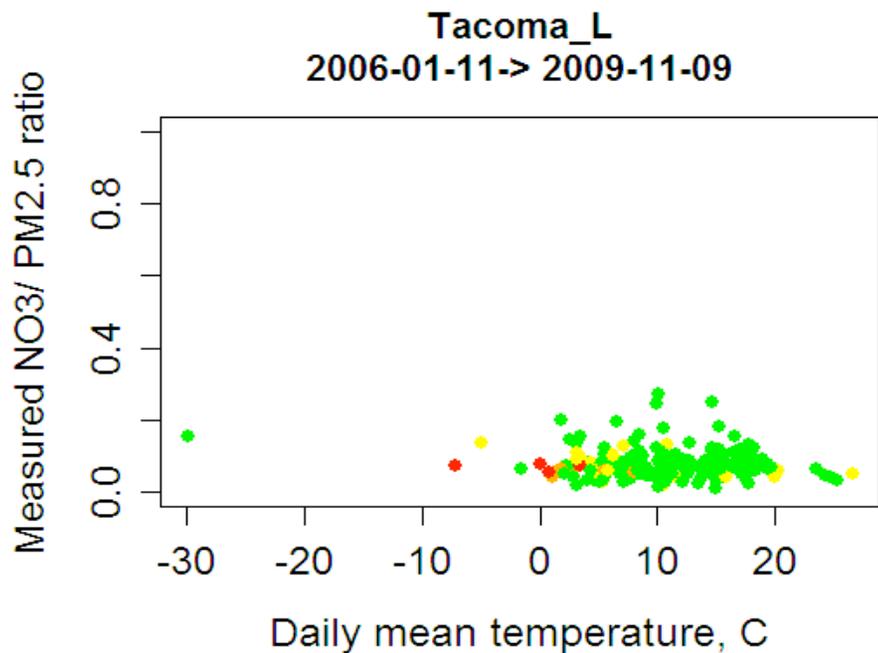
Used CSN and IMPROVE speciation data to verify



- Spokane and La Grande (OR) CSN sites terminated in Jan '09 and Nov '07.
- IMPROVE data from Spokane reservation terminated in June '05.
- Obtained IMPROVE data through Mar '09 and CSN data upto Nov '09.

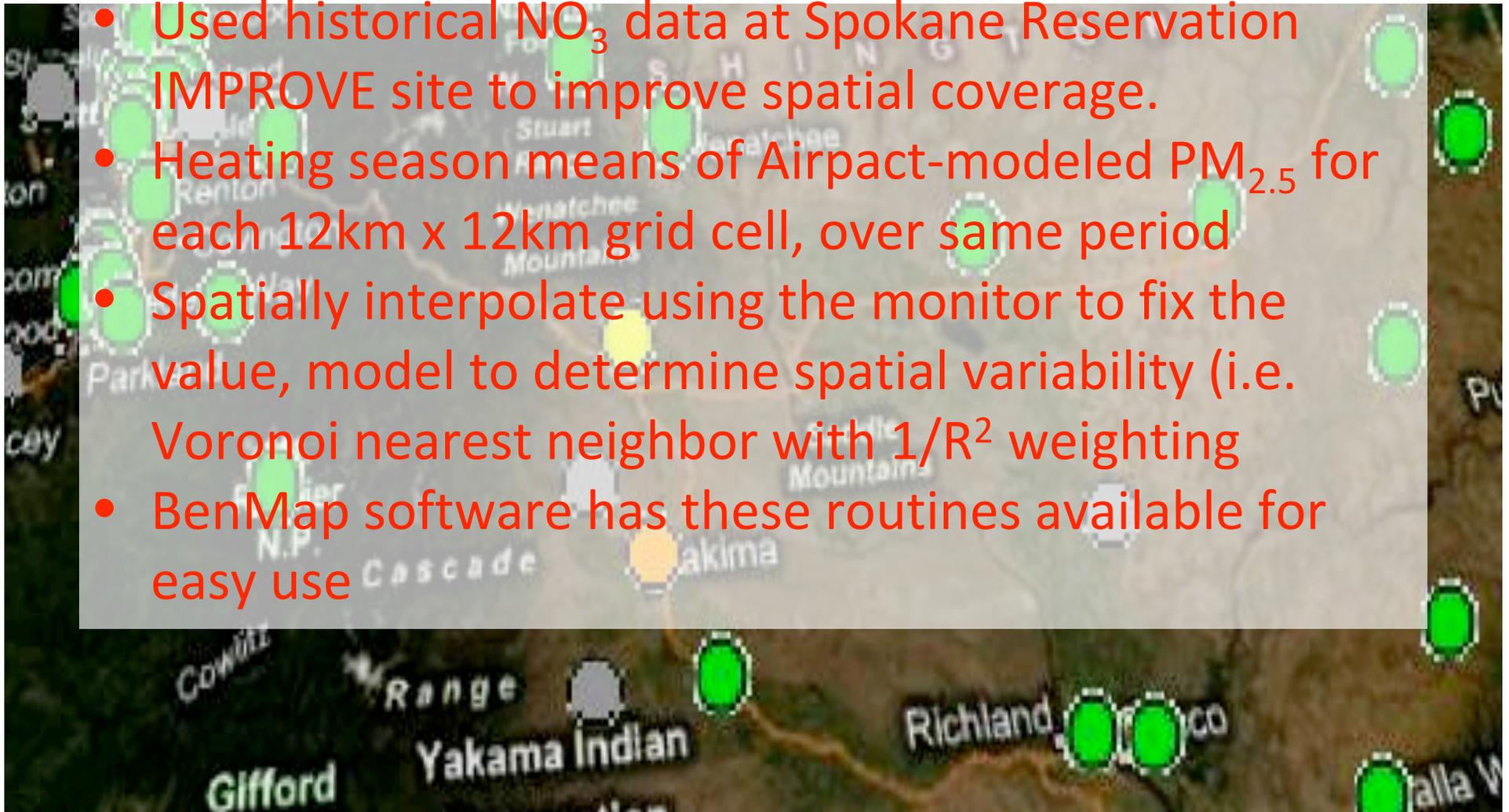


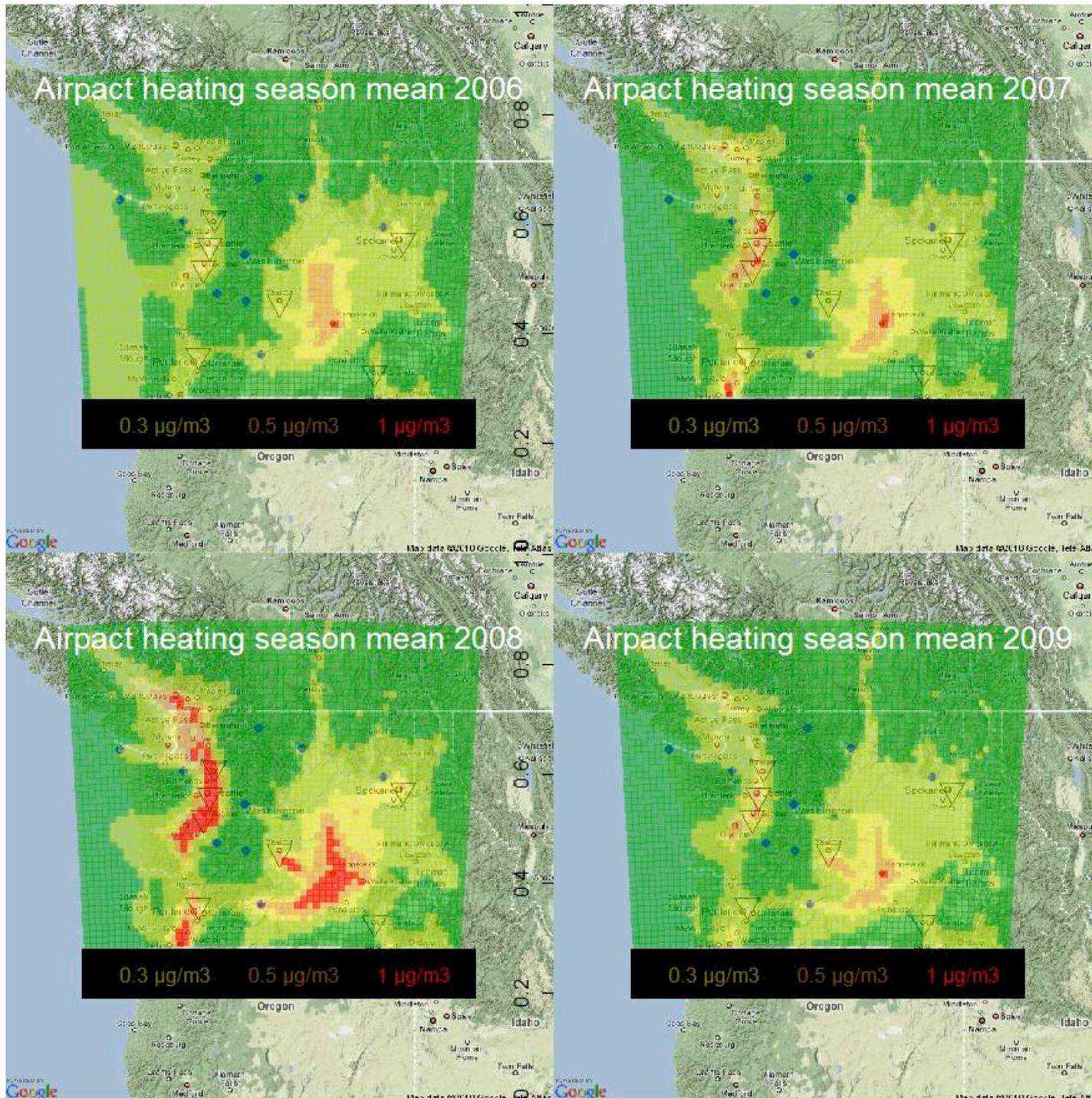




To determine spatial variability of NO_3 , we used:

- NO_3 and $\text{PM}_{2.5}$ data collected during the 2006- 2009 heating seasons, at each speciation site.
- Used historical NO_3 data at Spokane Reservation IMPROVE site to improve spatial coverage.
- Heating season means of Airpact-modeled $\text{PM}_{2.5}$ for each 12km x 12km grid cell, over same period
- Spatially interpolate using the monitor to fix the value, model to determine spatial variability (i.e. Voronoi nearest neighbor with $1/R^2$ weighting
- BenMap software has these routines available for easy use

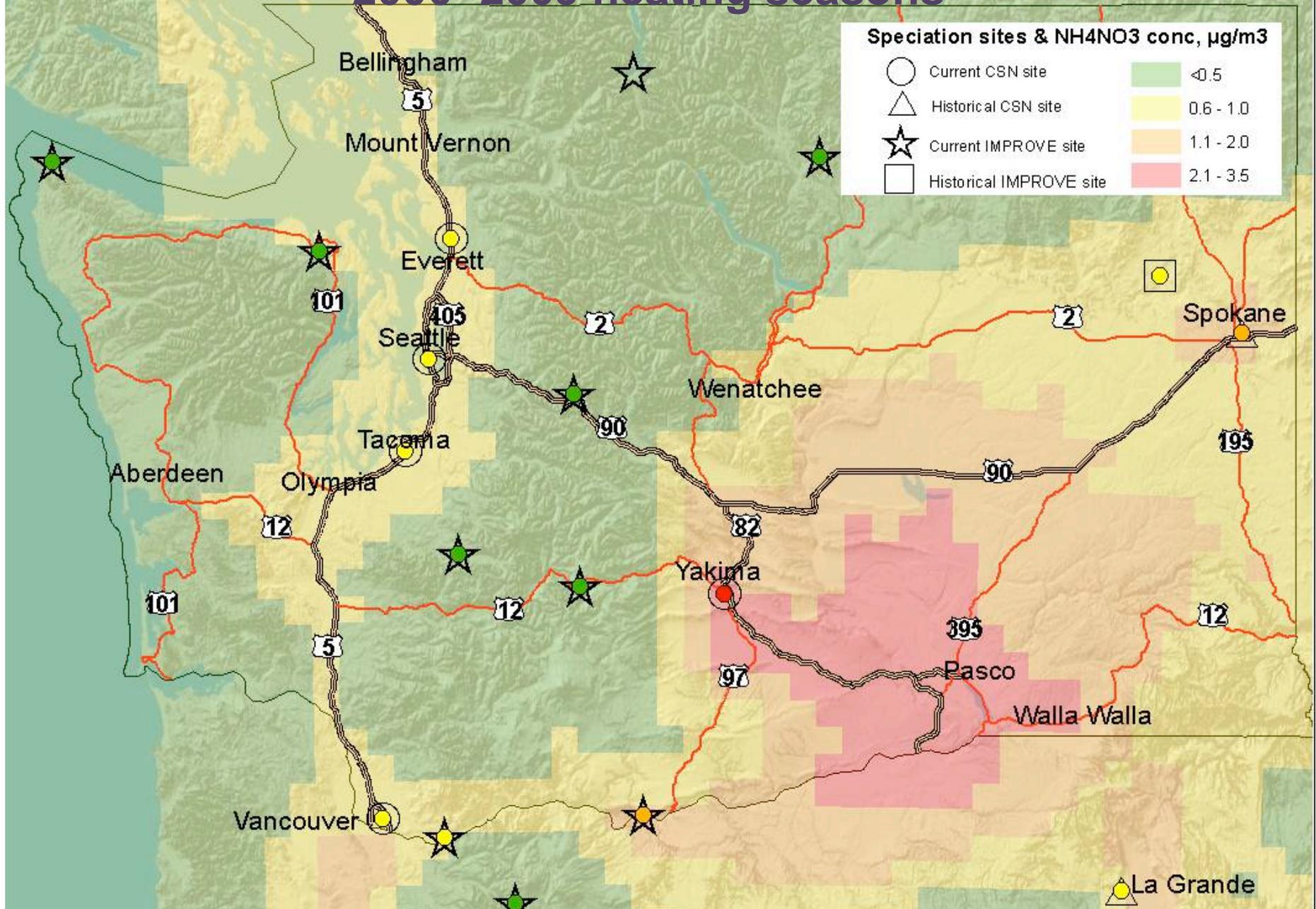




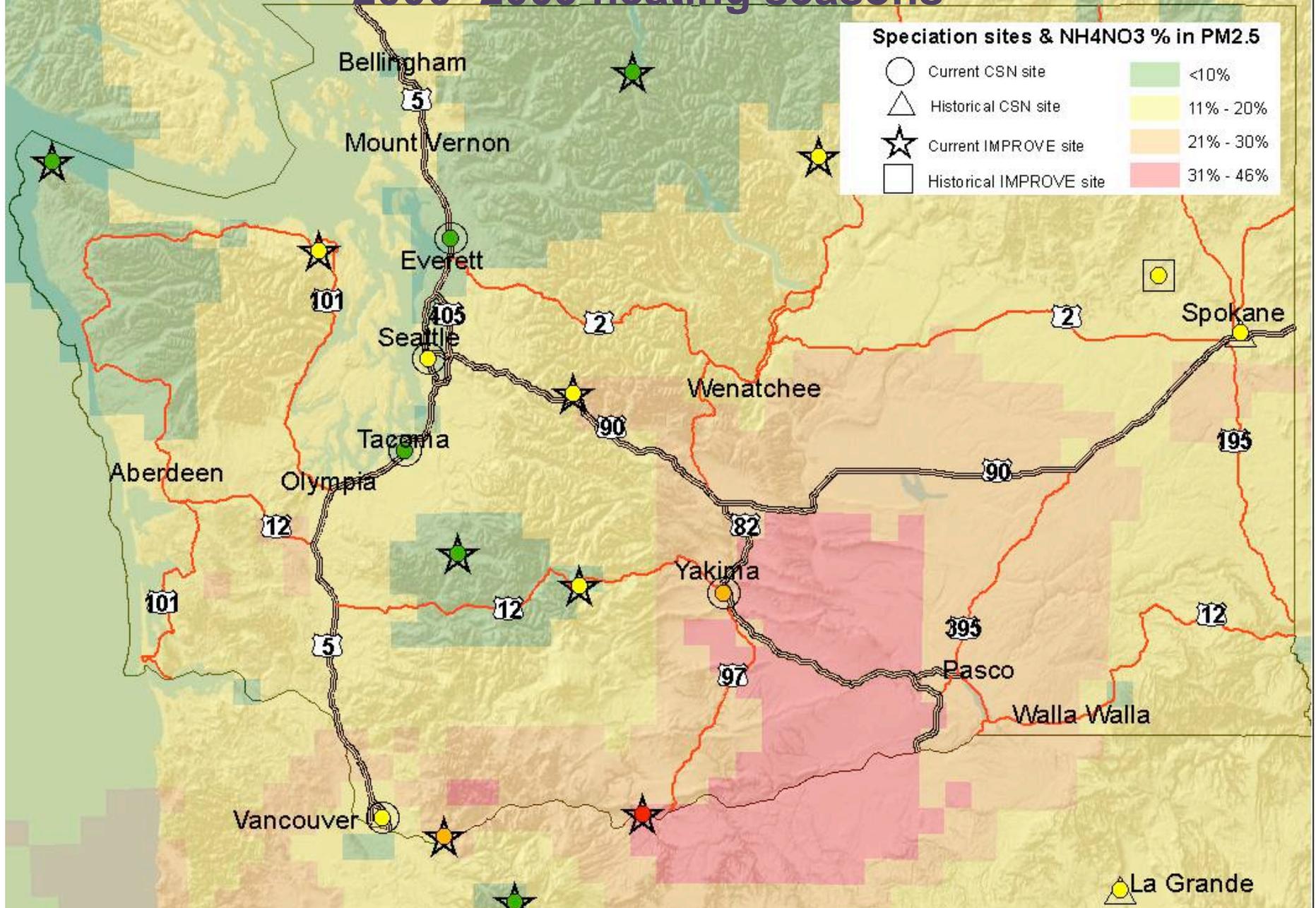
Seasonal means of modeled ANO₃, by year.

Not interpolated with monitors.

Model- monitor interpolated NO_3 concentrations 2006- 2009 heating seasons



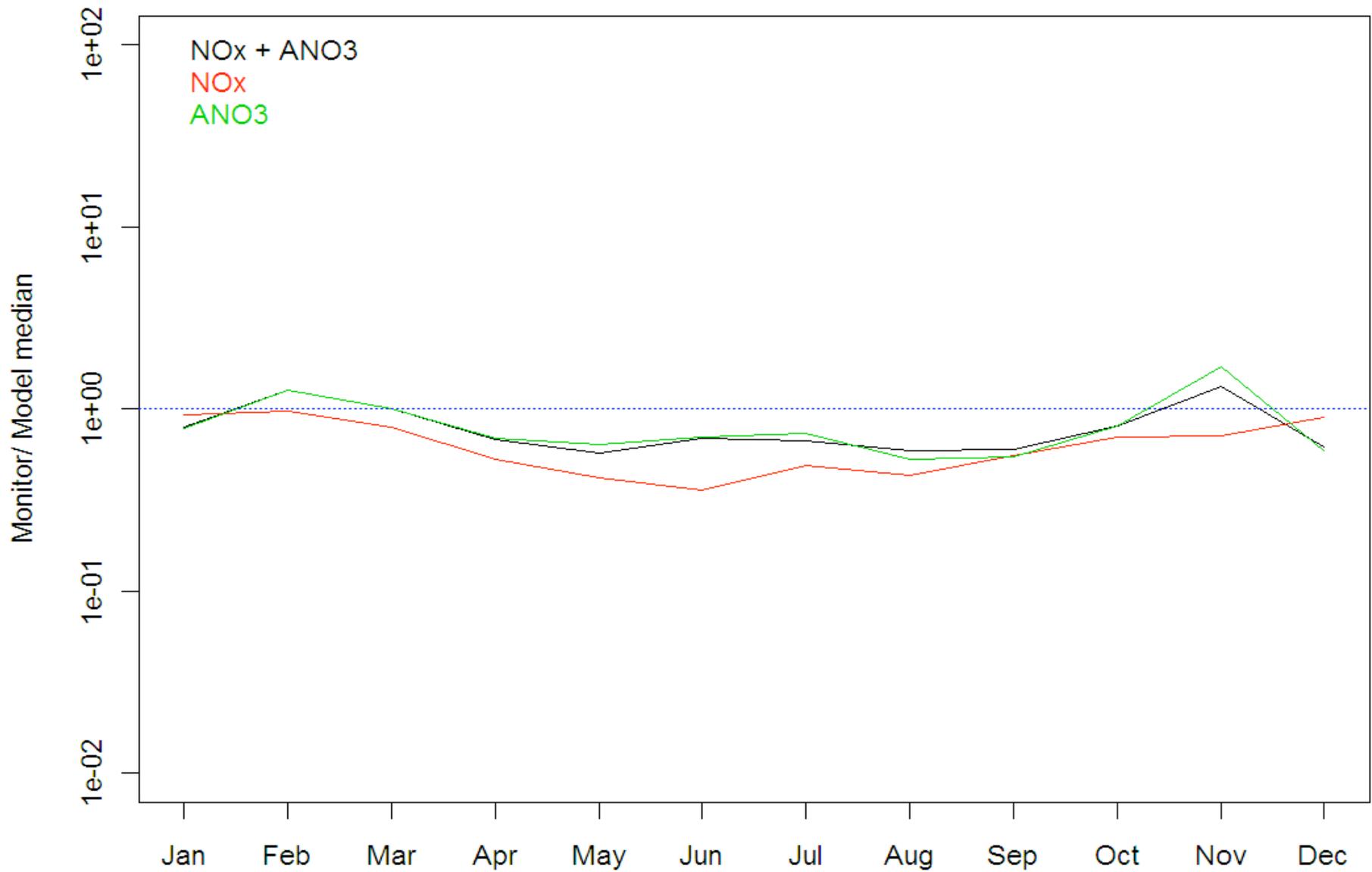
Model- monitor interpolated $\text{NO}_3/\text{PM}_{2.5}$ ratios 2006- 2009 heating seasons



Conclusions

- There does appear to be a sizeable fraction of aerosol nitrate in the Columbia basin
- Not all nitrate can be explained by the large point source (Agrium @ Kennewick; ~ 100 tons primary NO_3 per year)
- In case of nonattainment areas, the SIP will have to deal with this
- Speciation monitor and/ or detailed modeling study in Columbia basin might be in order

Medians for N species Seattle_Beacon_Hill



Diurnal profile of PNO3 in Airpact on 8/14/2008

