

Trends in Yakima Speciation Data

Ranil Dhammapala

WA Dept of Ecology

ranil.dhammapala@ecy.wa.gov

Bob Kotchenruther

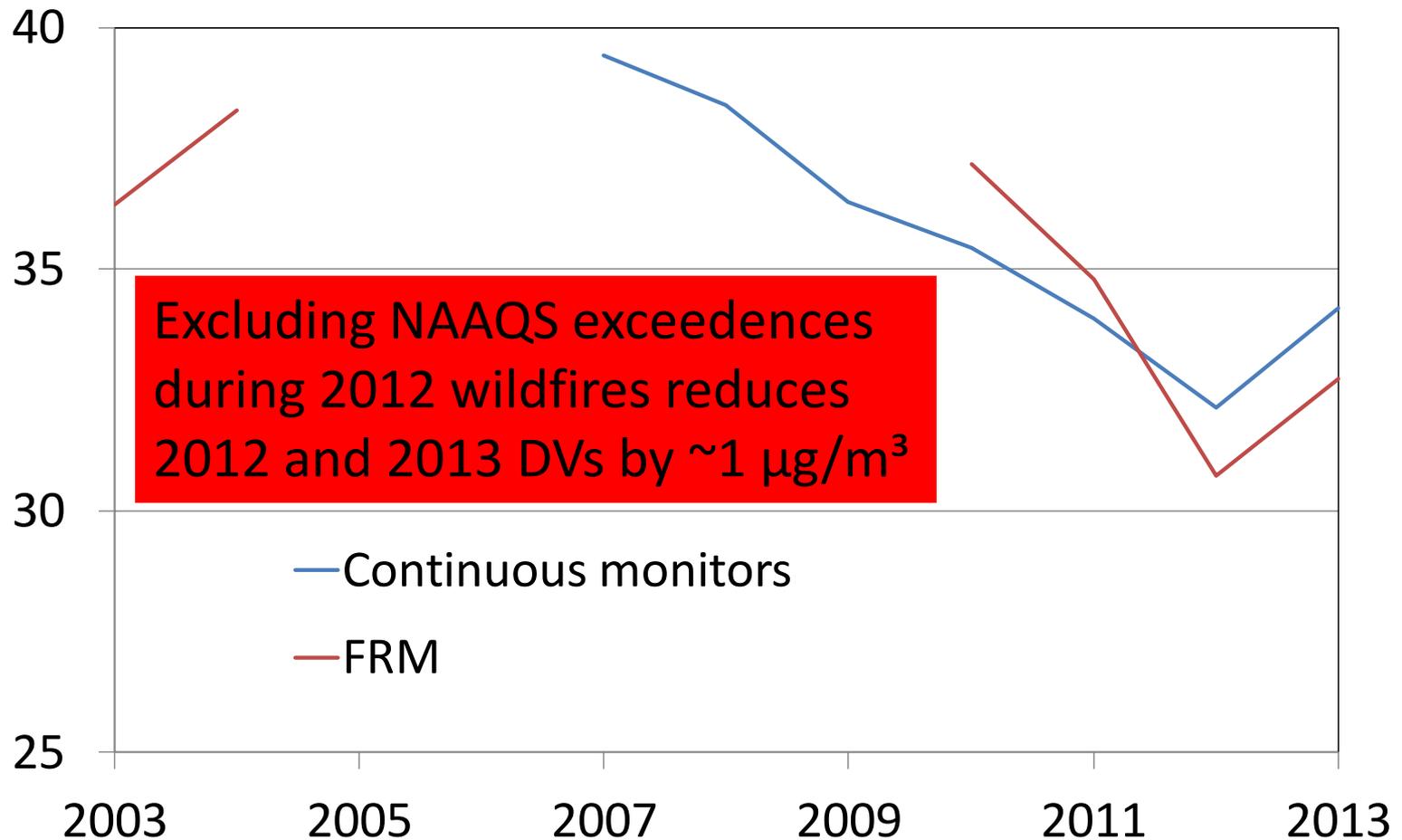
EPA Region X

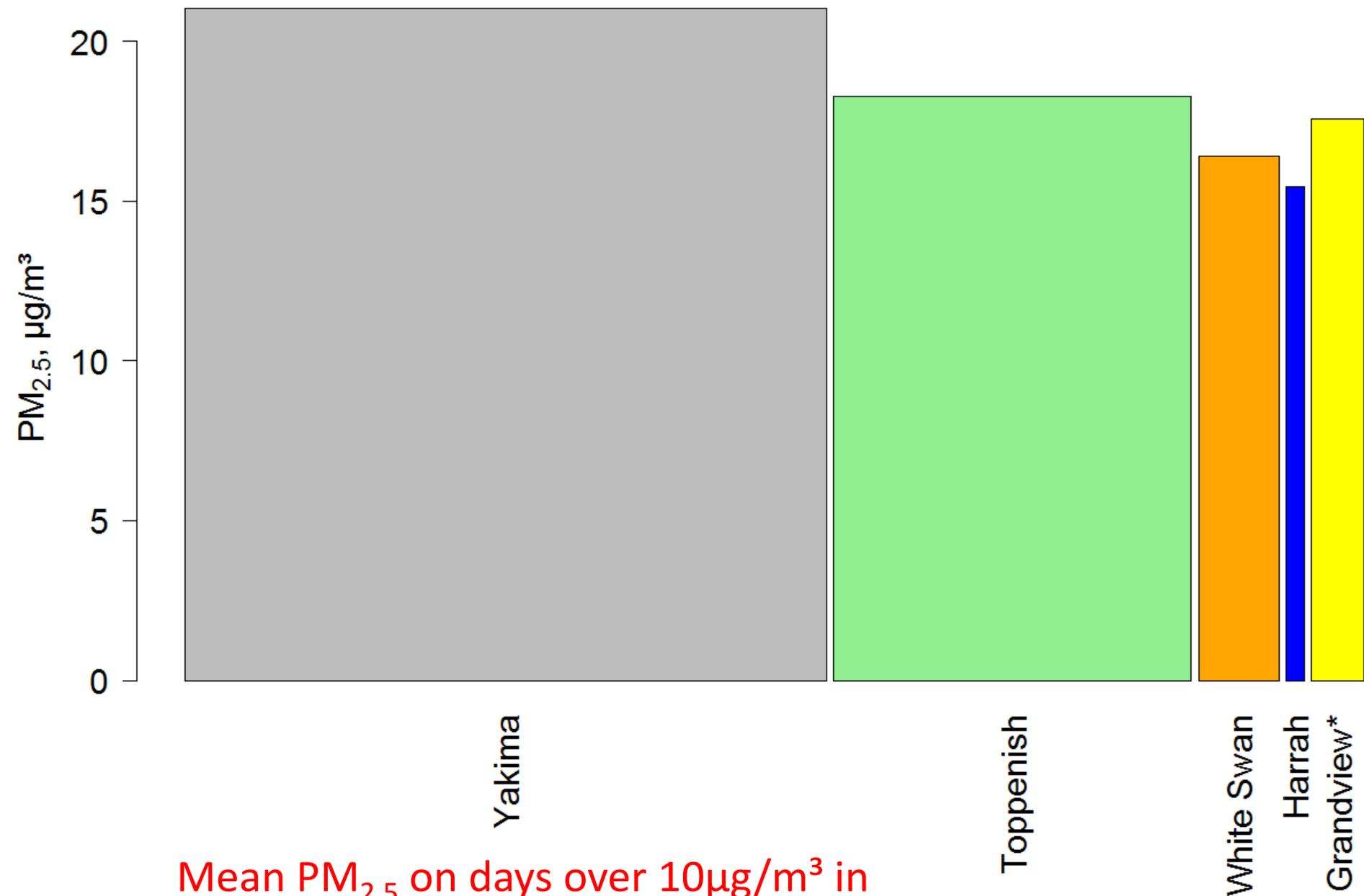
Kotchenruther.Robert@epa.gov



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Yakima 24-hr PM_{2.5} design values





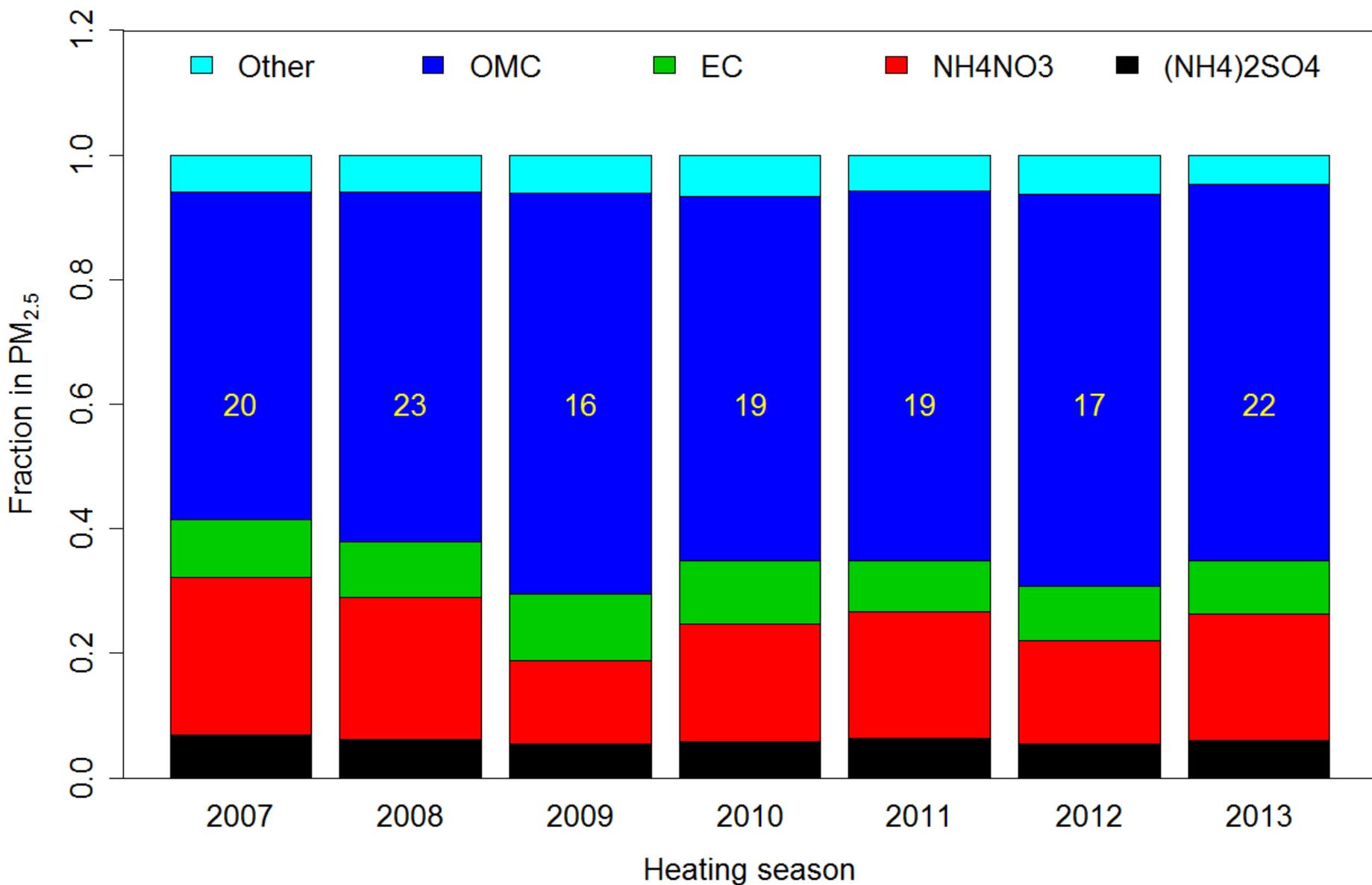
Mean PM_{2.5} on days over 10µg/m³ in Yakima county.

Wider bars= longer data record

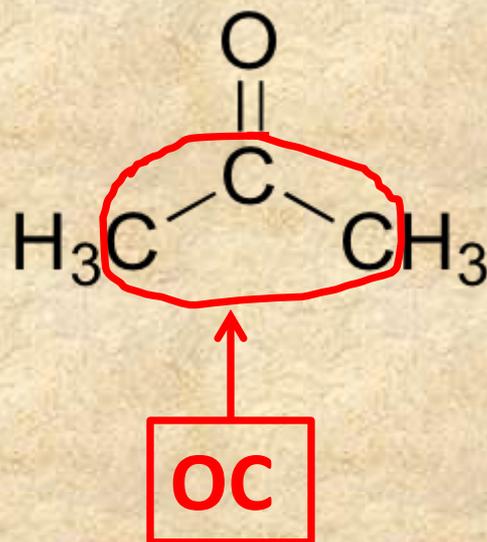


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Mean heating season $PM_{2.5}$ breakdown on days with $PM_{2.5} > 10\mu g/m^3$

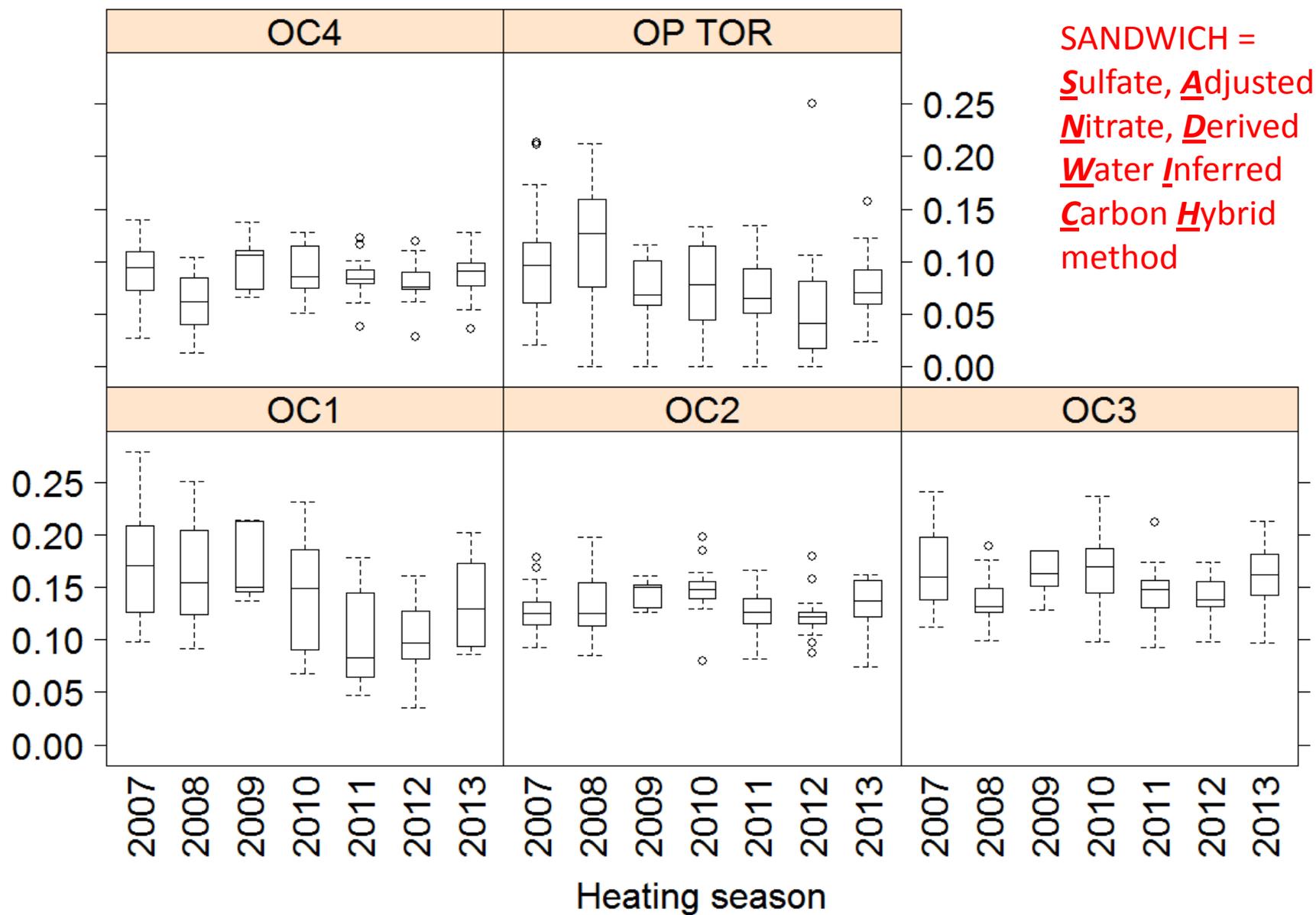


Organic Carbon (OC) vs. Organic Mass Carbon (OMC)

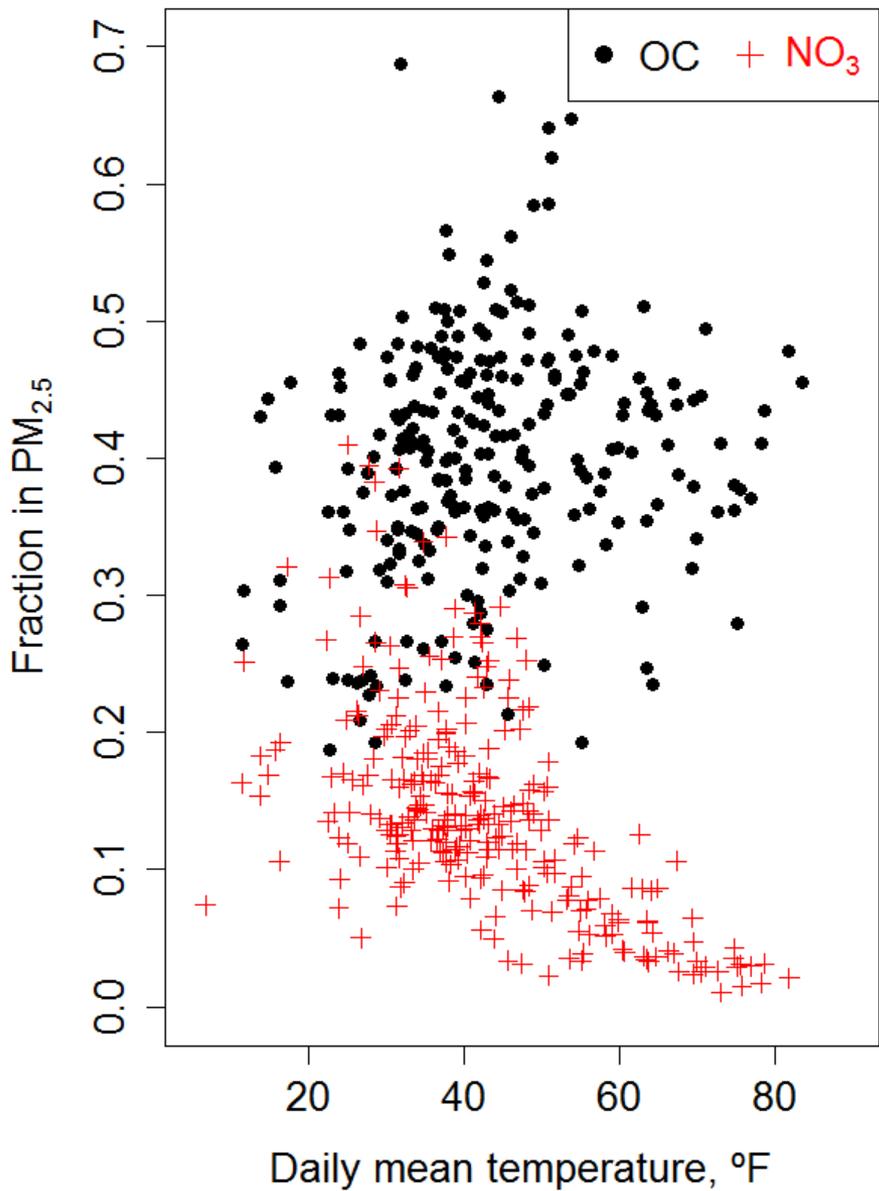


OC subfractions by heating season on days with $PM_{2.5} > 10\mu g/m^3$

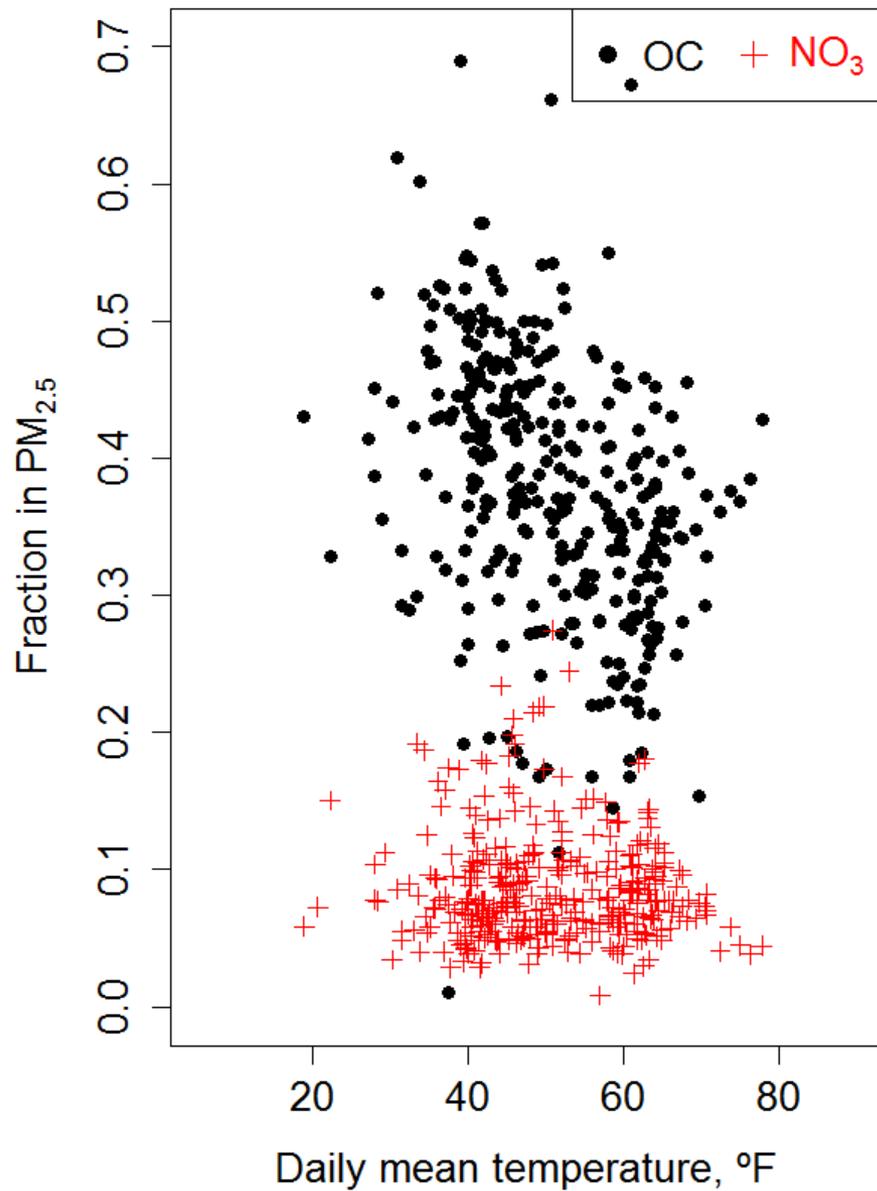
OC[1-4] & OP as a fraction of SANDWICH'ed OMC



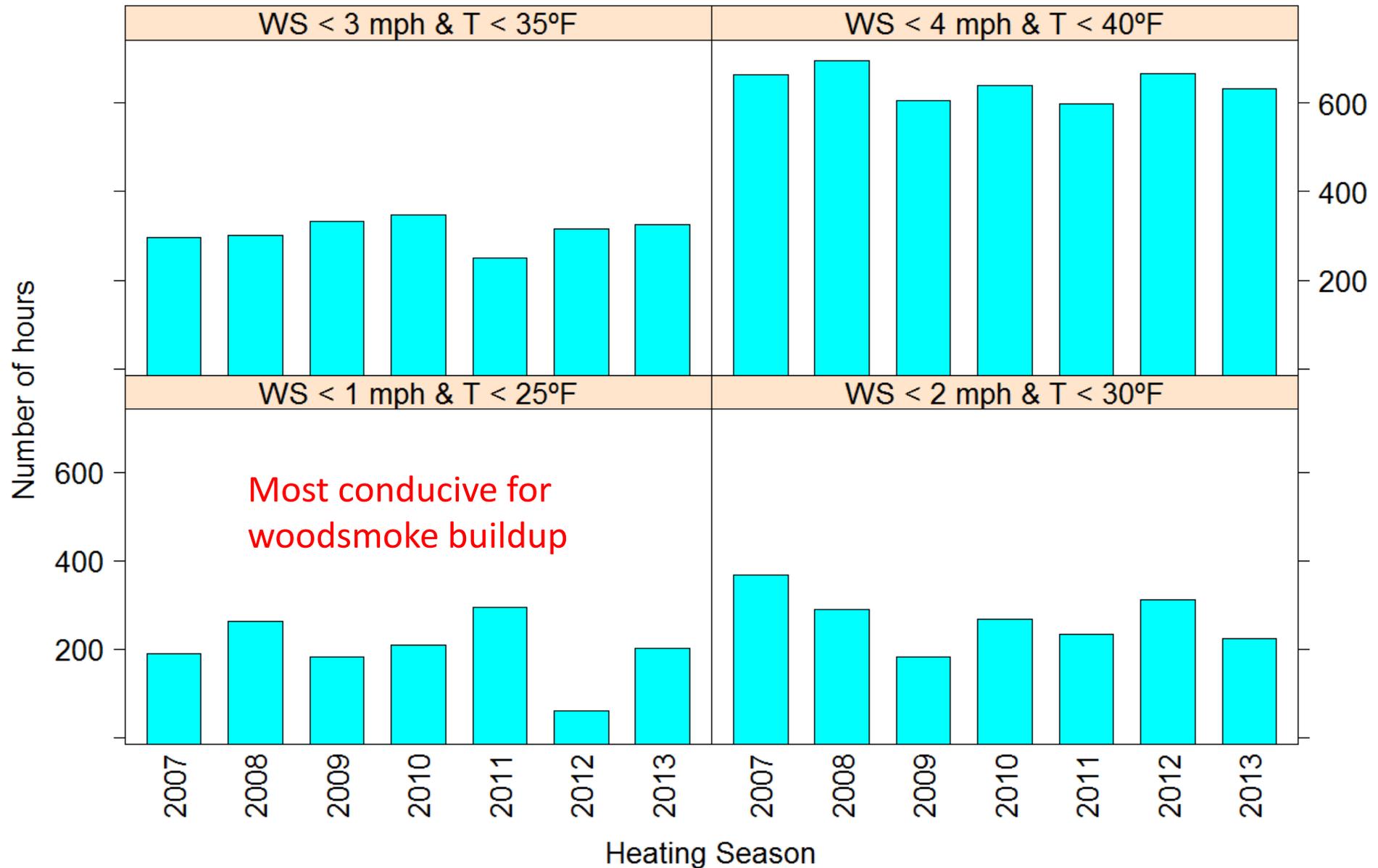
Yakima, 2007-2013



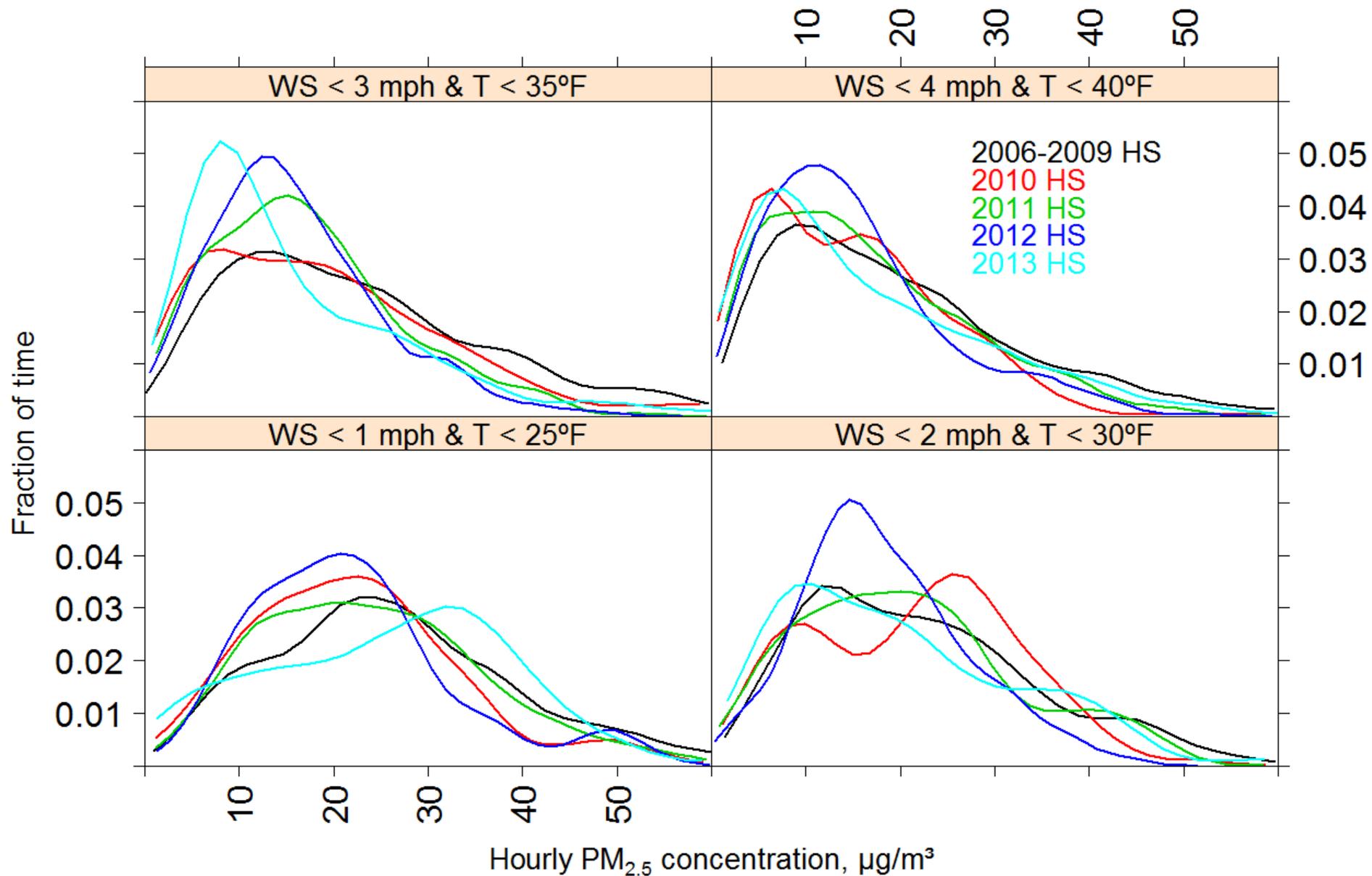
Tacoma, 2007-2013



Number of hours in each meteorological category



Comparing distributions of hourly PM_{2.5} concentrations by windspeed and temperature ranges



~~The Bob K factor~~

Positive Matrix Factorization by Bob K

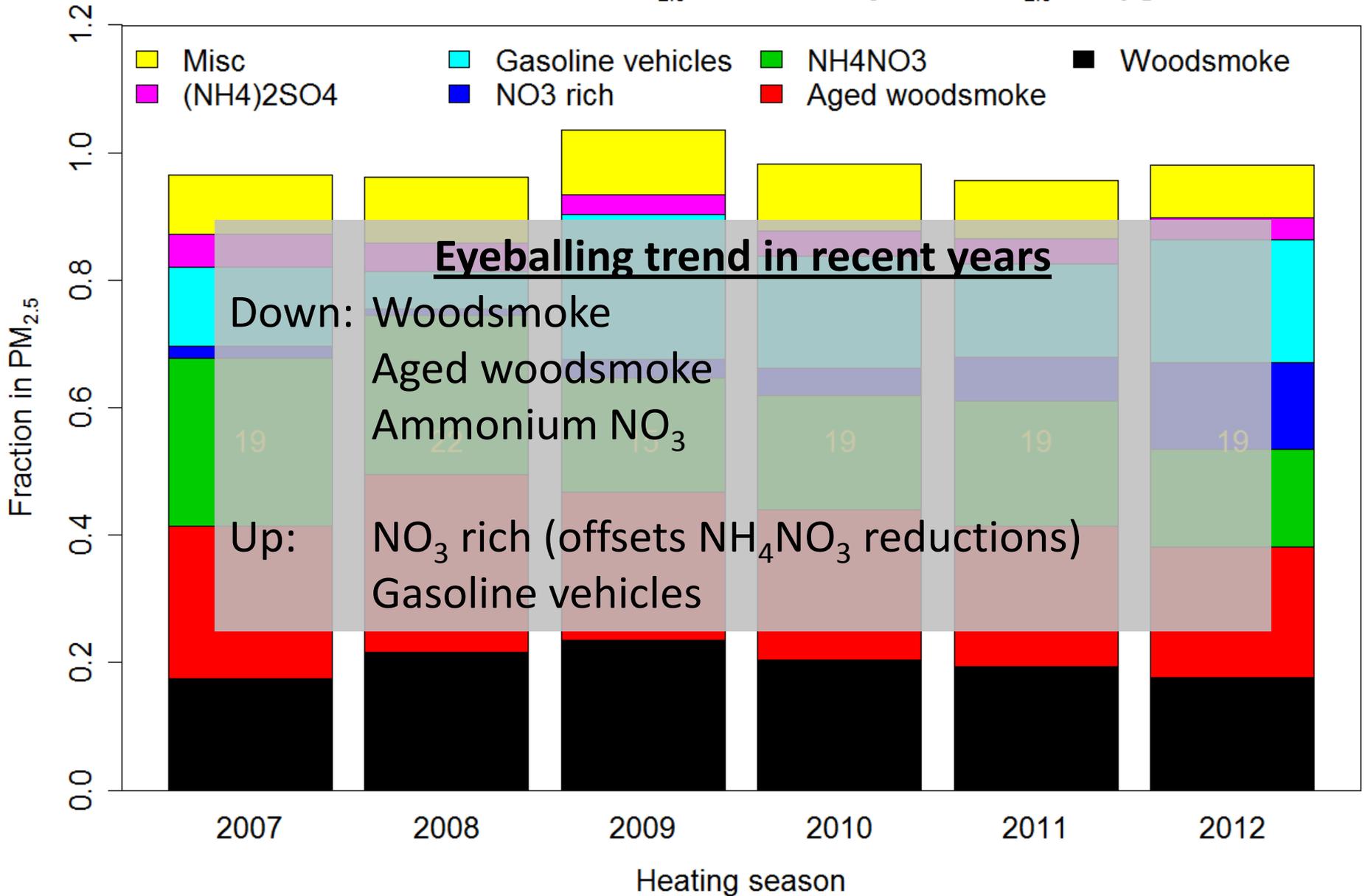
Ran PMF for all EPA Region 10 sites, through 2012 HS

Identified 9 factors:

- Ammonium SO_4
- Gasoline vehicles
- NO_3 rich
- Unidentified urban sources
- Ammonium NO_3
- OP rich (aged woodsmoke)
- Woodsmoke
- Fugitive dust
- Seasalt

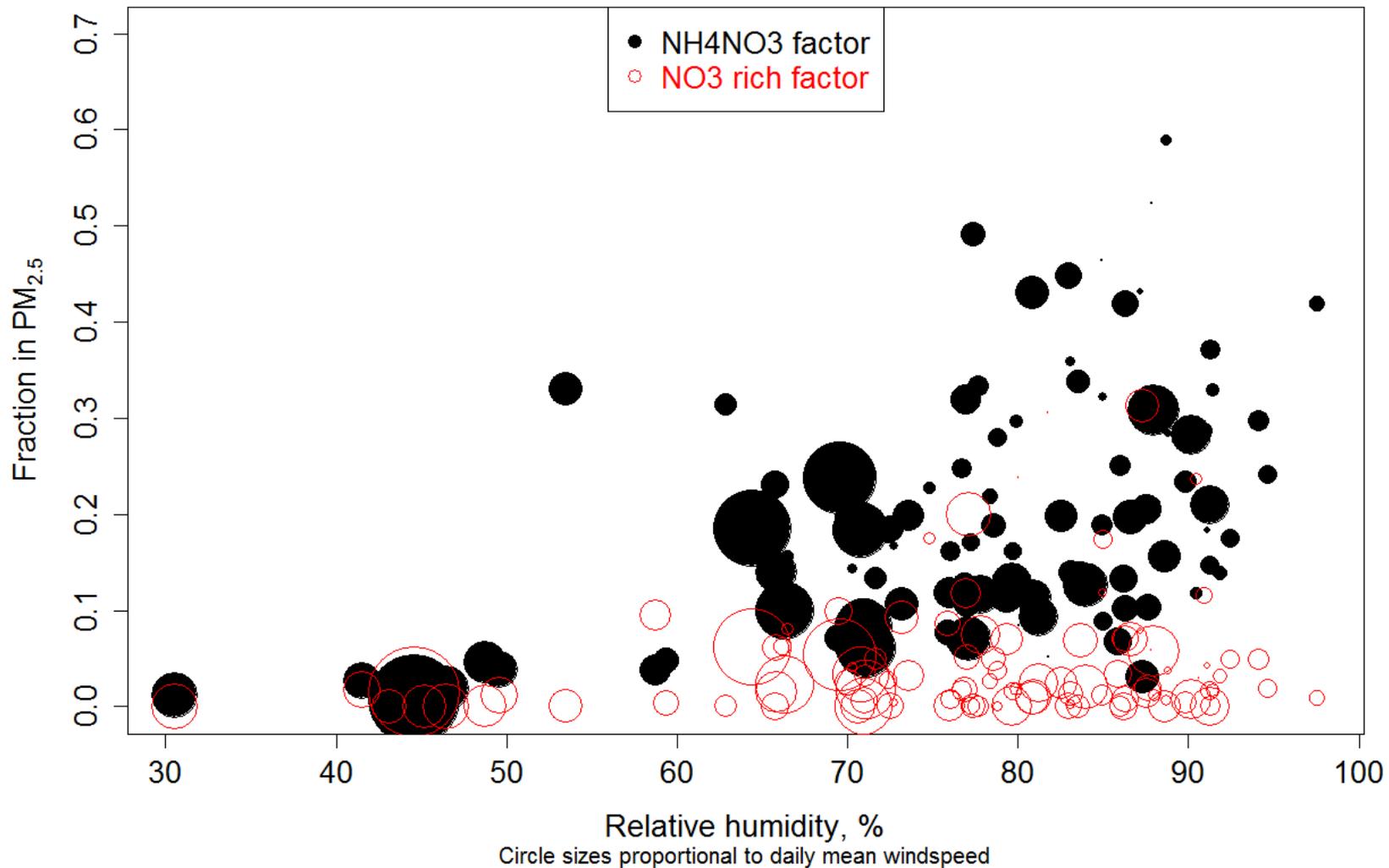


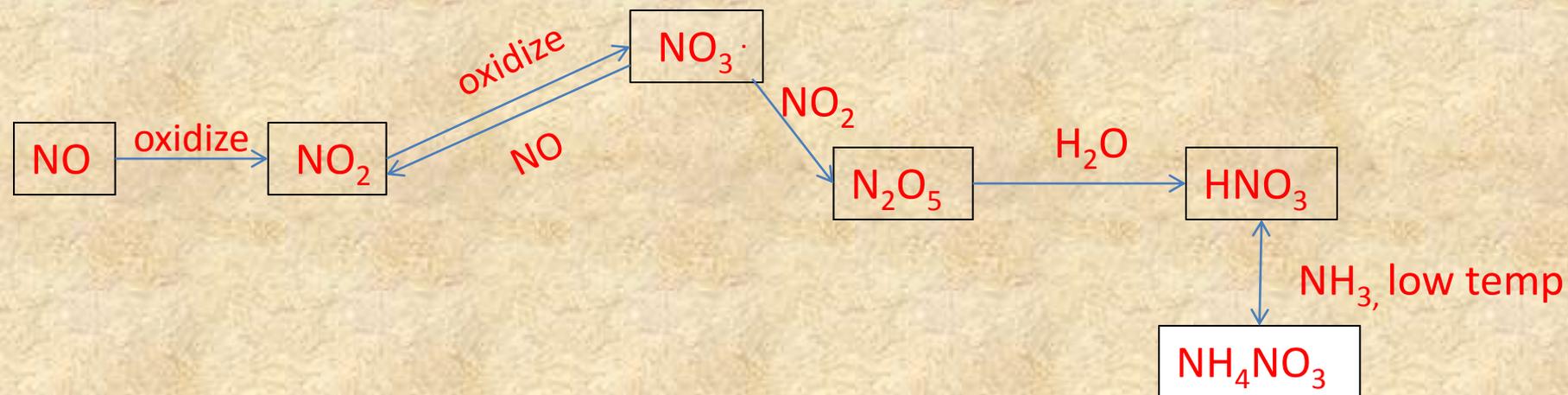
Mean fractions of each PM_{2.5} factor on days with PM_{2.5} >10 µg/m³



Recent YAWNS study found that Yakima is likely ammonia rich. The recent increase in “Nitrate rich” factor is not likely to be due to a change in ammonia availability

Comparison of ammonium nitrate and nitrate rich PMF factors in Yakima

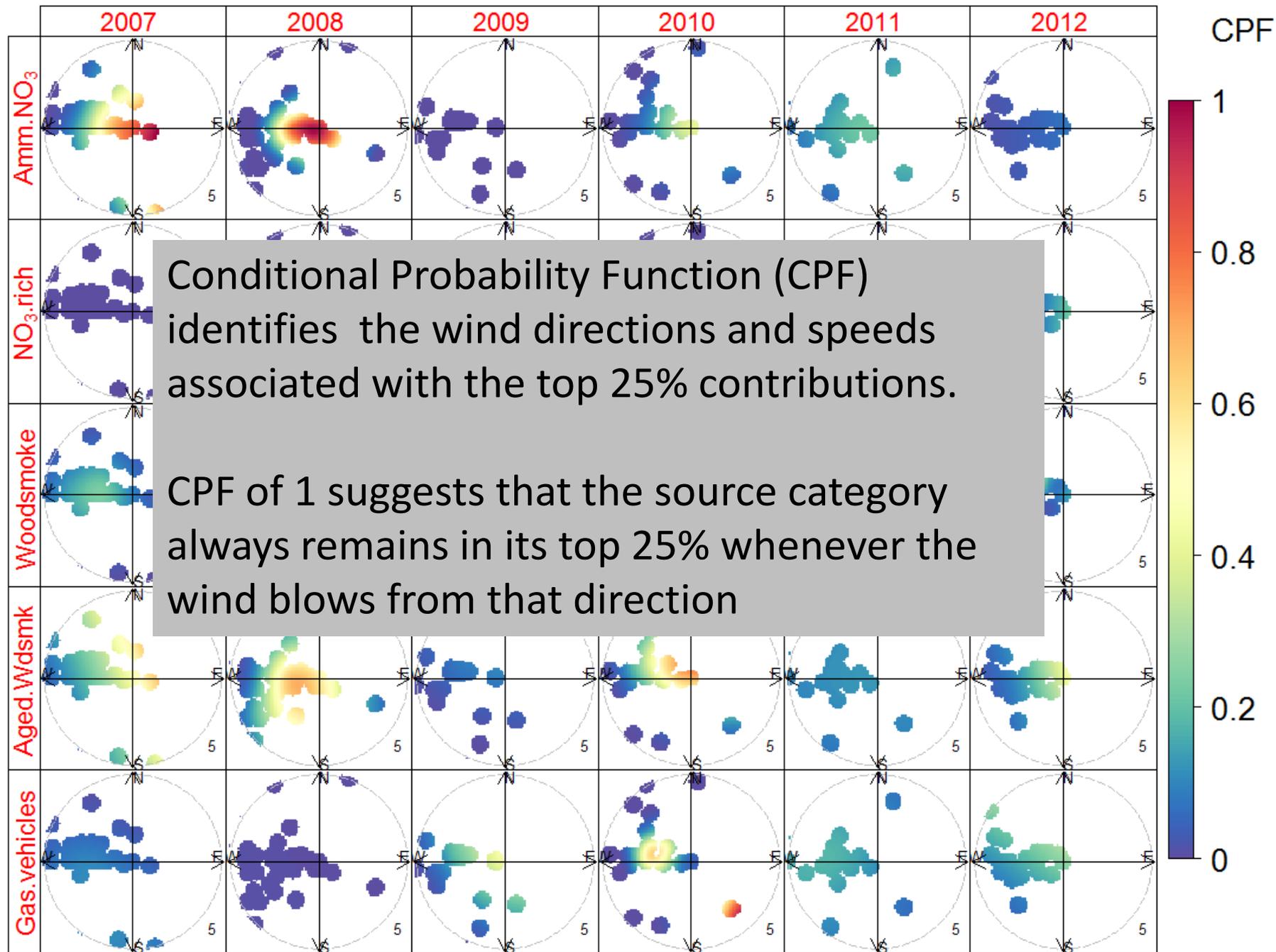




Hydrolysis of N₂O₅ needs to proceed irrespective of whether or not the ensuing HNO₃ is fully neutralized by ammonia.

Hydrolysis might not be an important step in the formation of the nitrate rich factor.

This factor also contains sulfate, EC and OC. Ammonium Nitrate factor does not. Organic nitrates? Origins in the transportation sector?



Radial lines are windspeeds (mph)

Conclusion

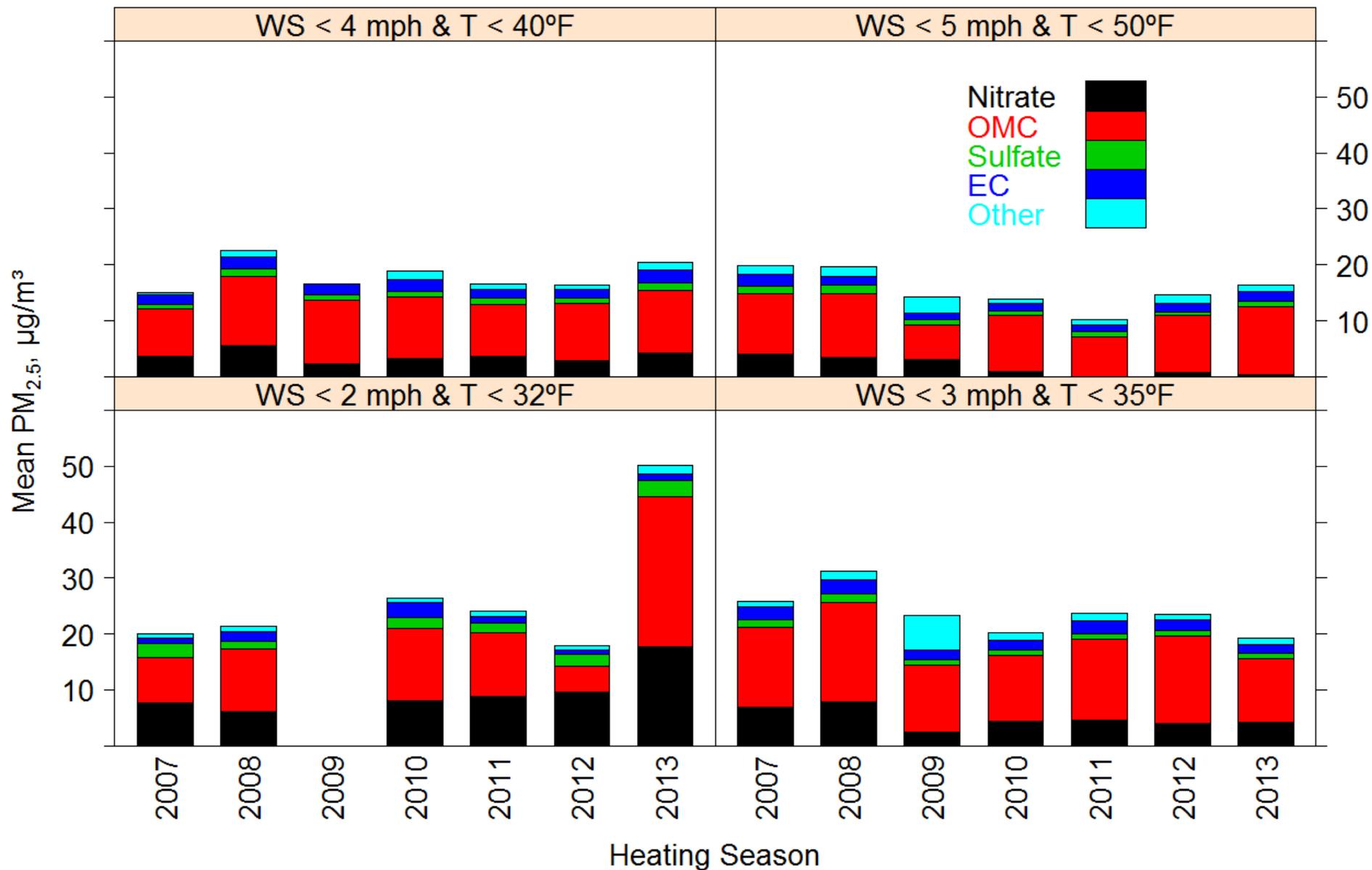
Have the reductions since 2010 been reversed? 2013 was not a meteorologically anomalous year

2013 heating season recorded an increase in $PM_{2.5}$ and its nitrate and OMC components

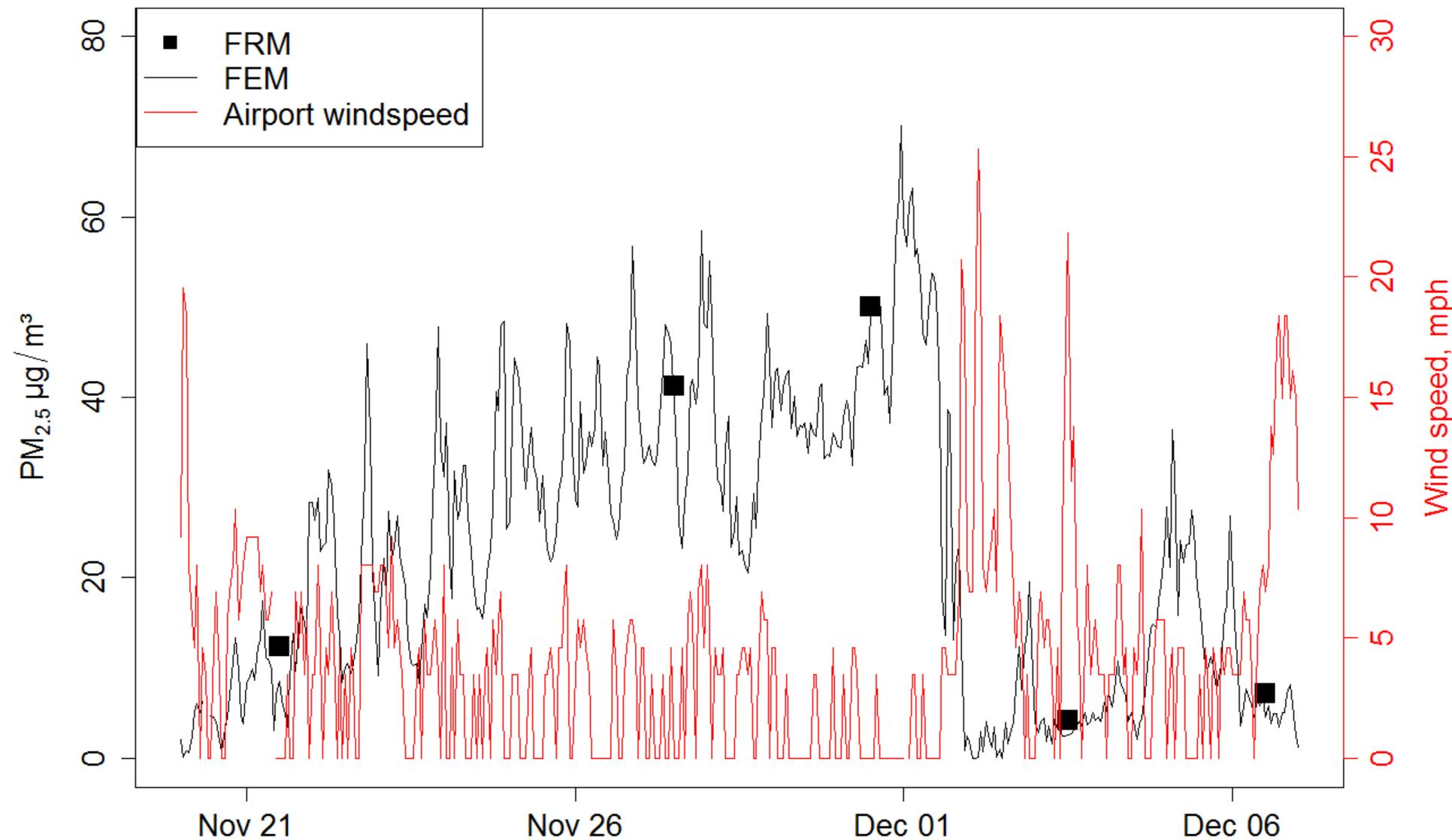
It is important to continue speciation monitoring to identify any subsequent changes to $PM_{2.5}$ levels- either upward or downward.



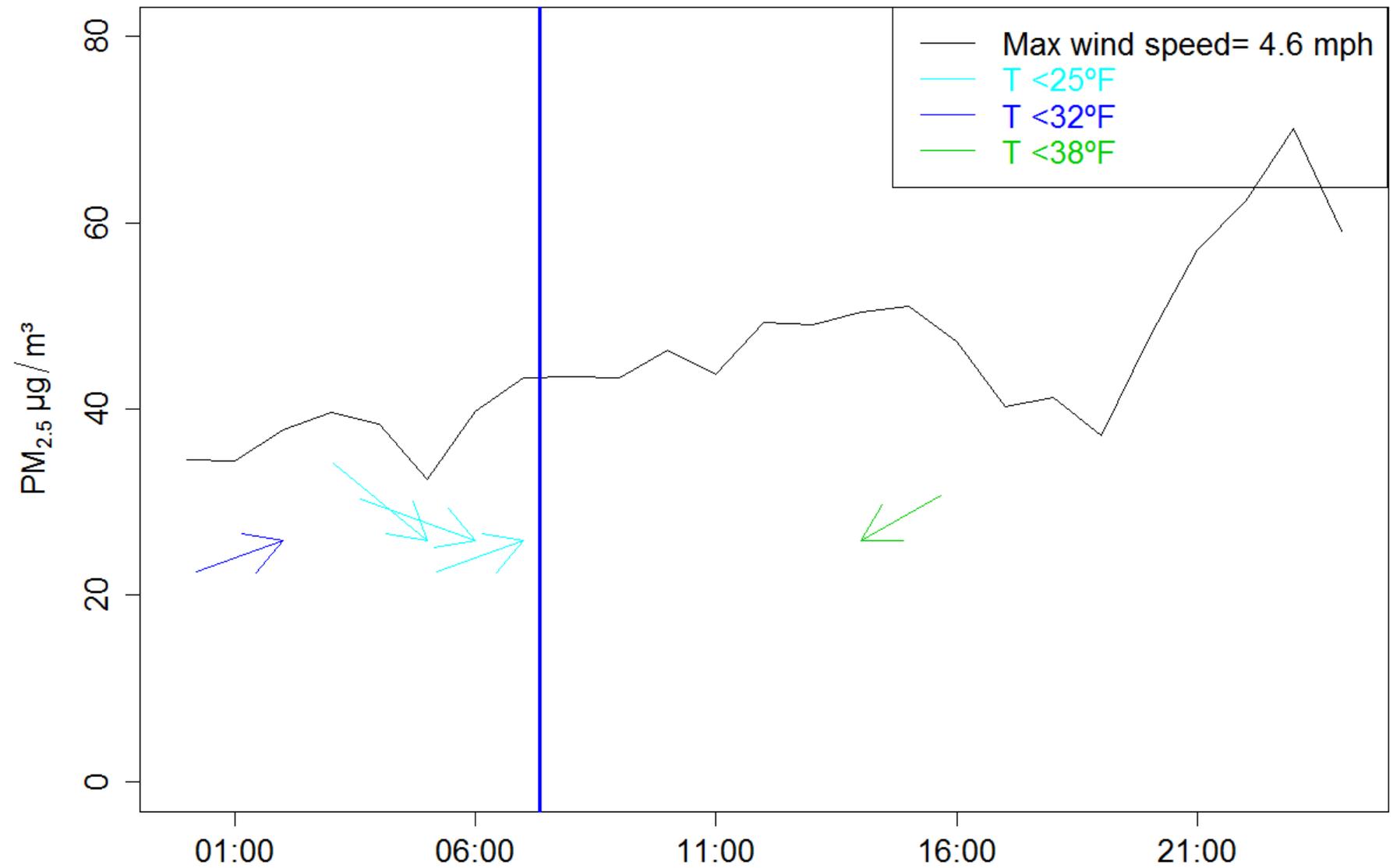
Average breakdown of PM_{2.5} on days >10µg/m³



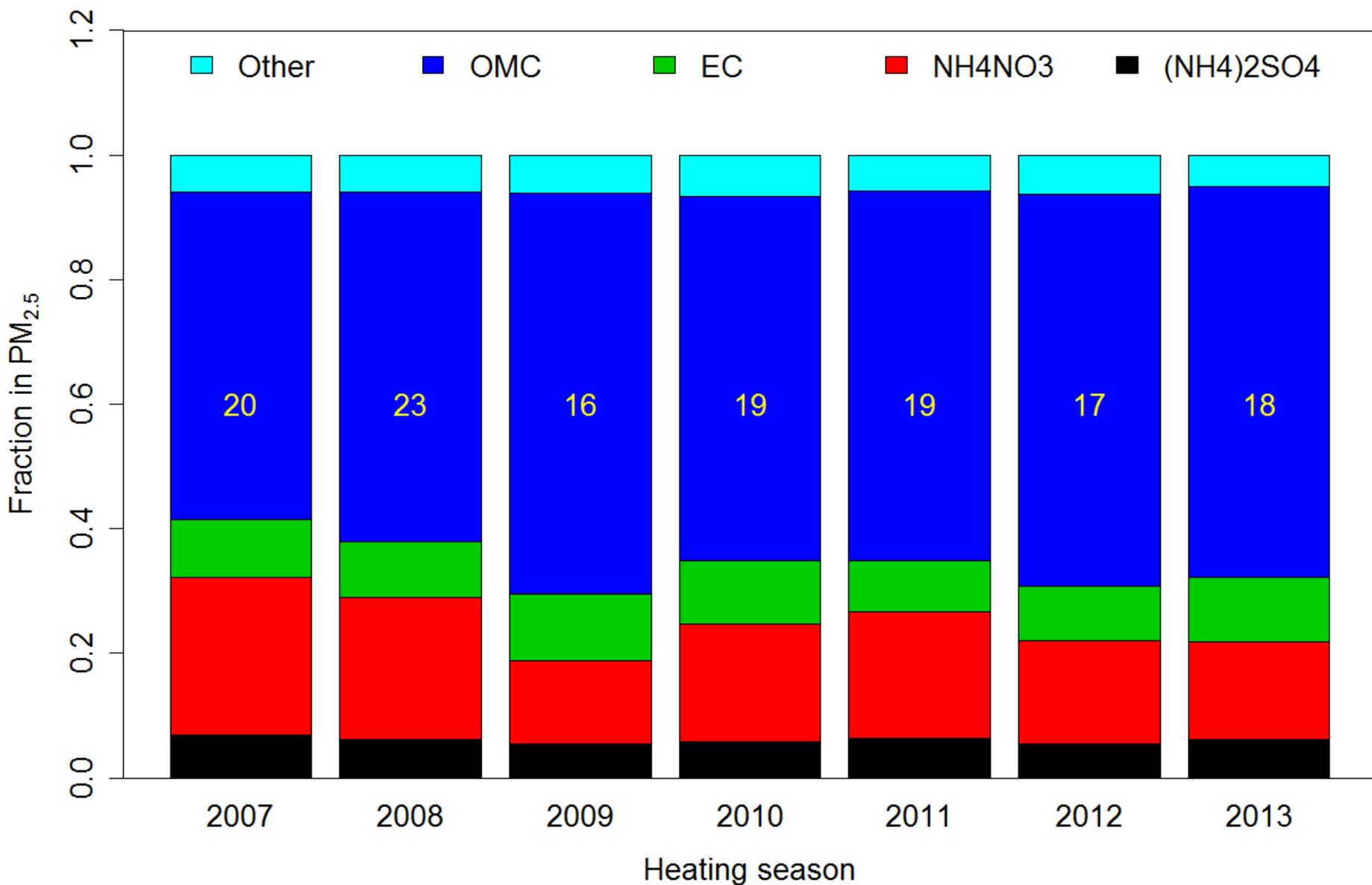
Yakima PM episode in late November 2013



Yakima PM episode, 30 November 2013



Mean heating season $PM_{2.5}$ breakdown on days with $PM_{2.5} > 10\mu g/m^3$



OMC/ OC ratio in Yakima by heating season

