

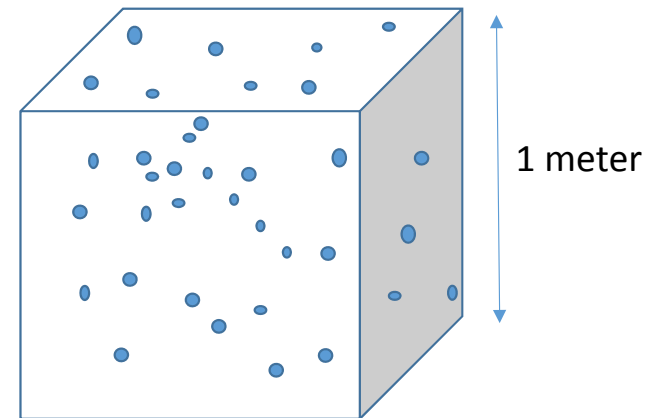
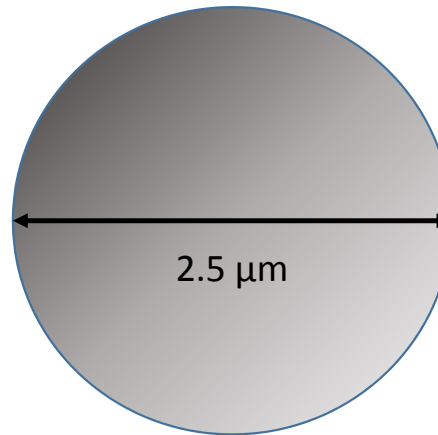
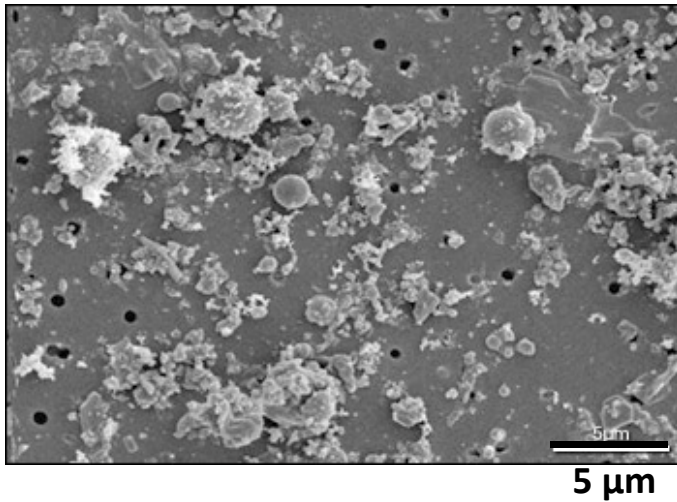
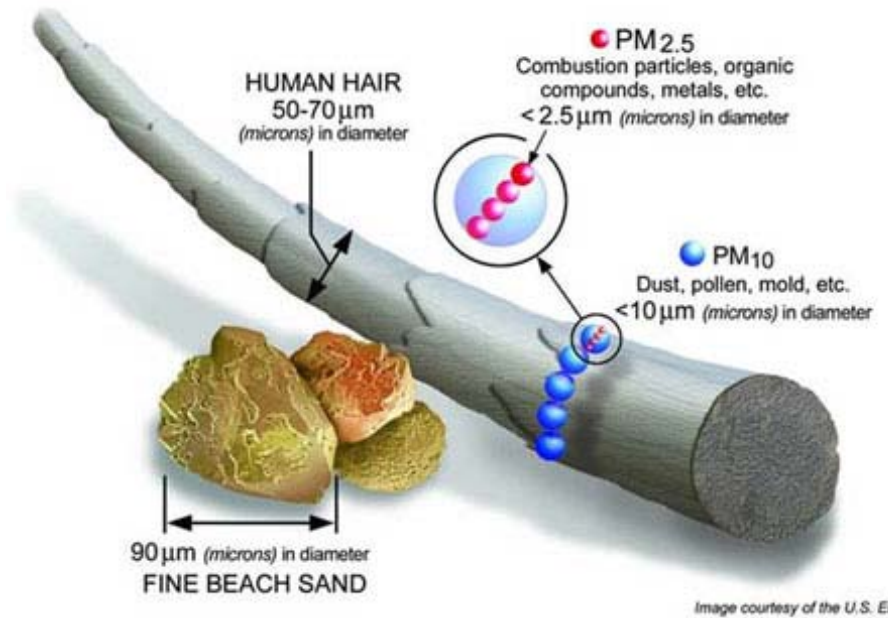
# Jefferson County Air Quality Saturation Study Results

**Odelle Hadley, PhD**  
**Senior Air Monitoring Specialist**  
**Olympic Region Clean Air Agency**

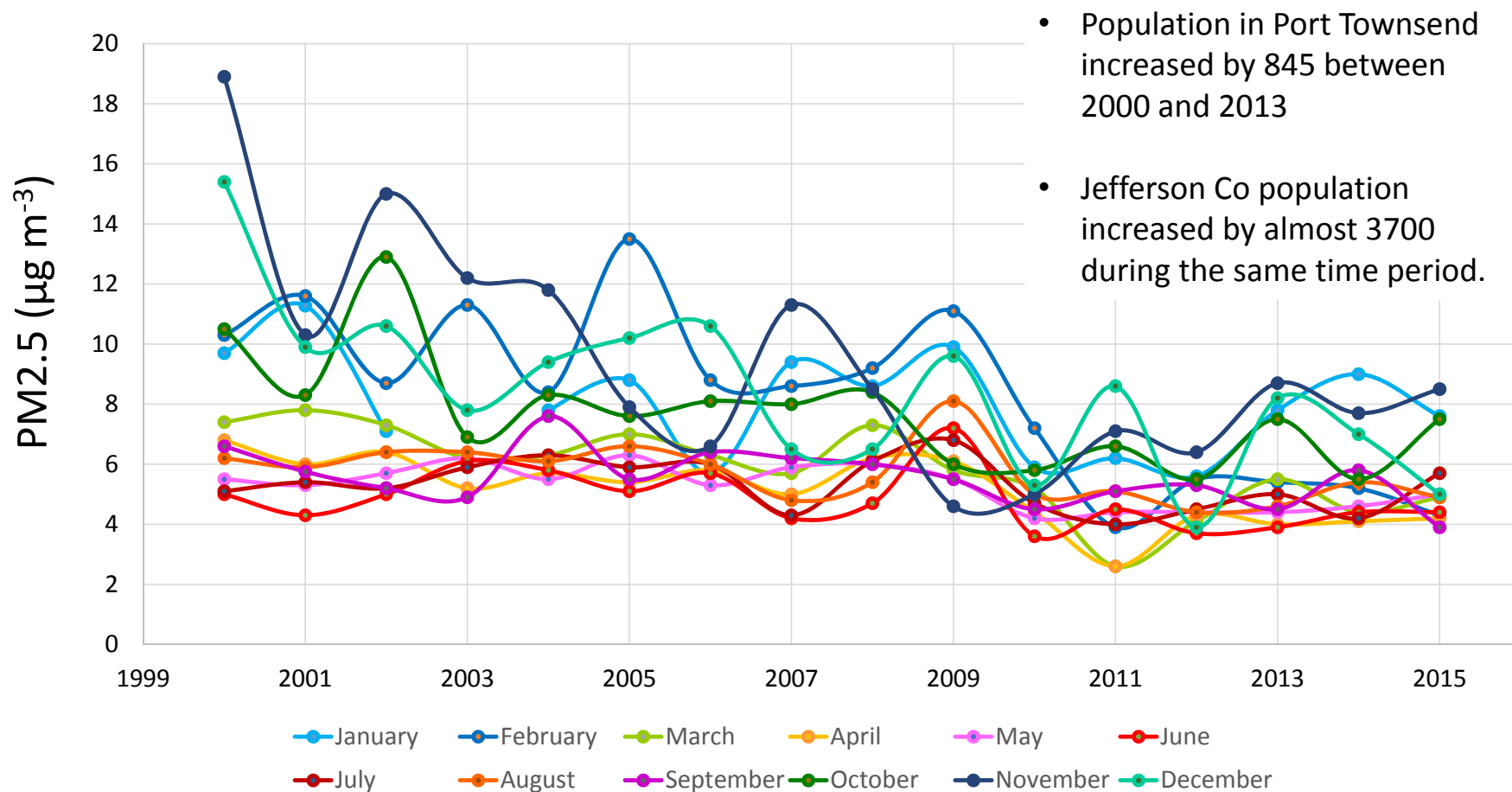
**March 26, 2016**

# What is PM2.5?

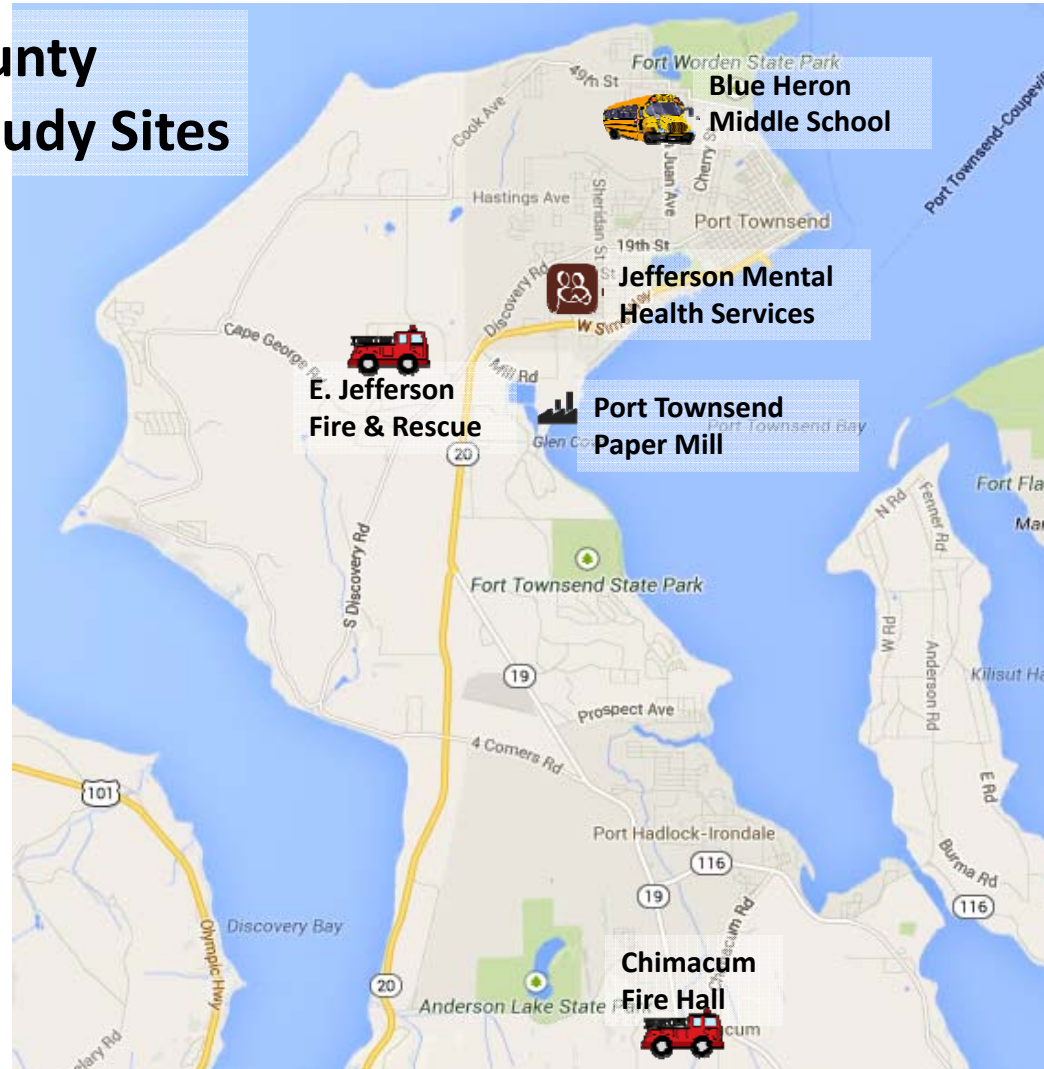
- Mass of particles in a cubic meter of air with diameters less than 2.5 micrometers (1 millionth of a meter)
- This size and smaller has the most harmful health effects



# P.T. Historical Air Quality – Monthly averages



# Jefferson County Saturation Study Sites





# Jefferson County Air Quality and National Ambient Air Quality Standards (NAAQS)

Annual average should not exceed  $12.5 \mu\text{g m}^{-3}$

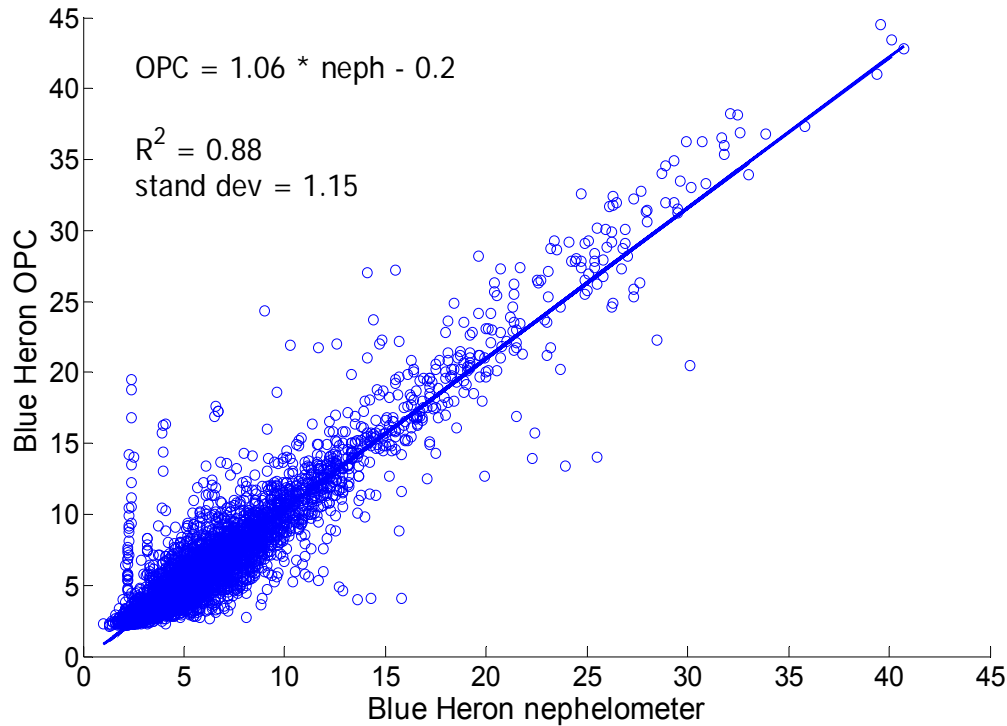
- Annual averages at the 4 stations in Jefferson County
  - Blue Heron Middle School -  $5.9 \mu\text{g/m}^3$
  - Jacob Miller Fire Station -  $5.7 \mu\text{g/m}^3$
  - Mental Health Building -  $5.2 \mu\text{g/m}^3$
  - Chimacum Fire Station -  $6.4 \mu\text{g/m}^3$

Daily average should not exceed  $35 \mu\text{g m}^{-3}$

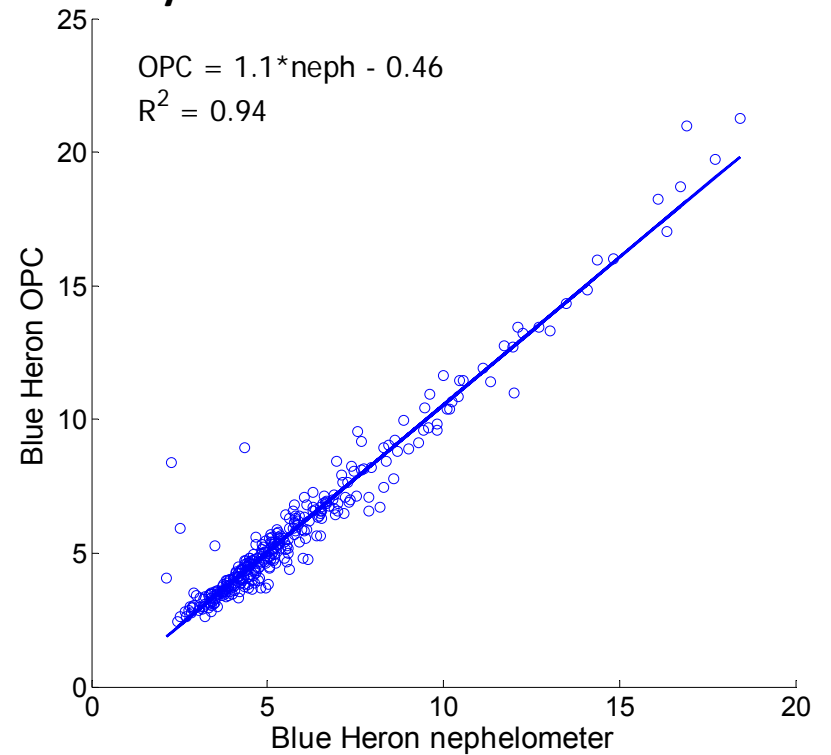
- Maximum daily averages at the 4 stations in Jefferson Co
  - Blue Heron Middle School –  $21.3 \mu\text{g/m}^3$  (unhealthy for sensitive groups)
  - Jacob Miller Fire Station –  $14.8 \mu\text{g/m}^3$  (moderate)
  - Mental Health Building -  $15 \mu\text{g/m}^3$  (moderate)
  - Chimacum Fire Station –  $18.2 \mu\text{g/m}^3$  (moderate)

# Optical Particle Counter (OPC) vs. Nephelometer (long term)

## Hourly Data

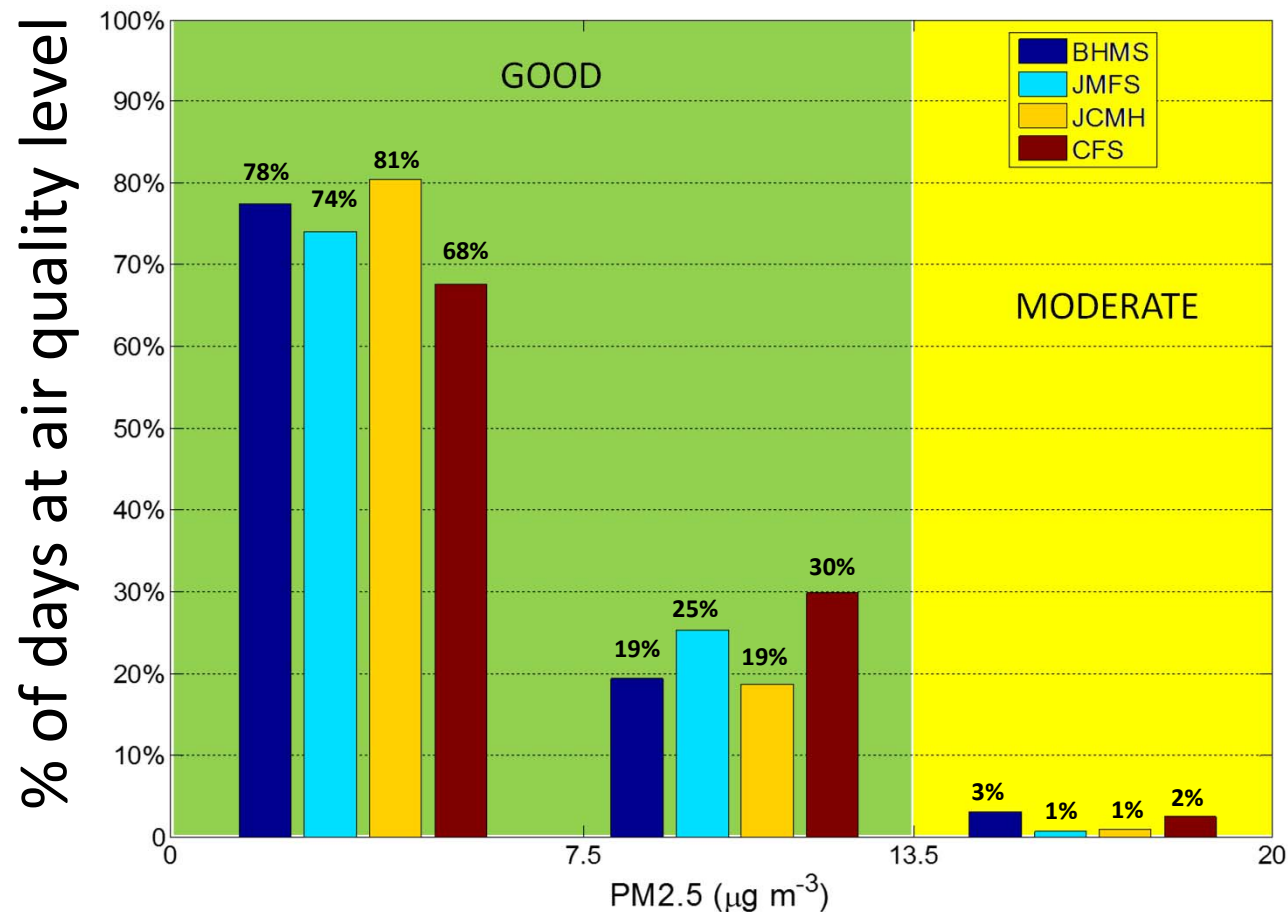


## Daily Data



# Distribution of healthy vs. moderate air quality days

(percentages based on number of days valid data were collected)



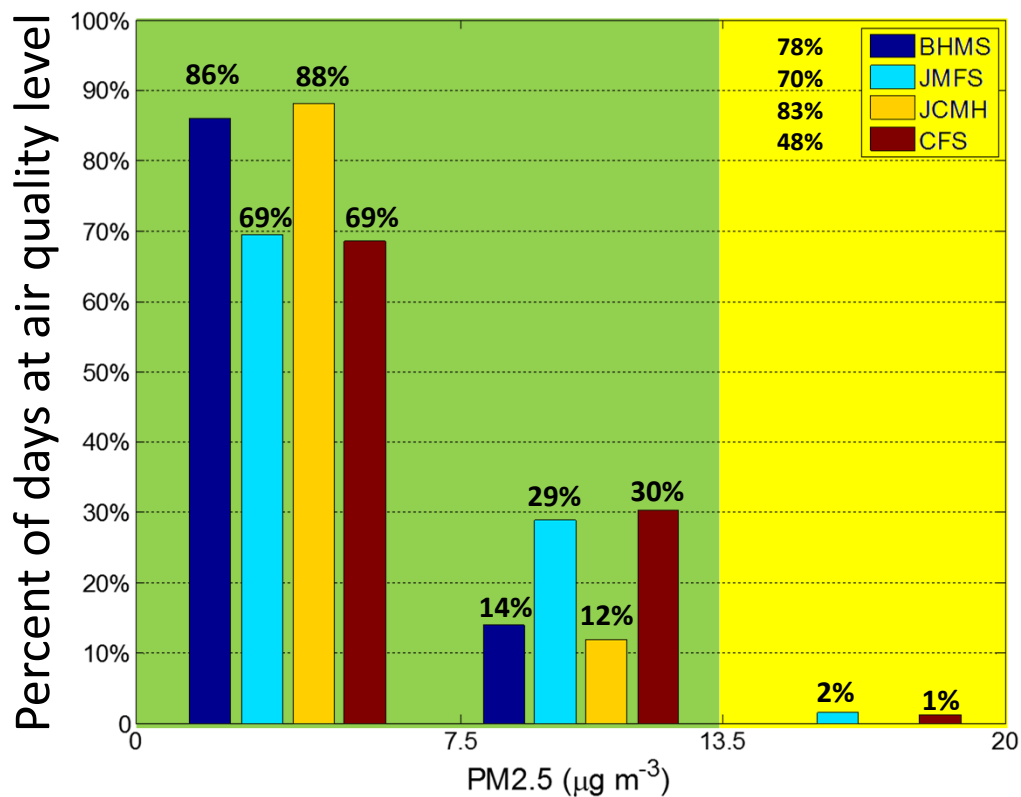
% of days for which valid data were collected

- BHMS - 97%
- JMFS - 88%
- JCMH - 94%
- CFS - 76%

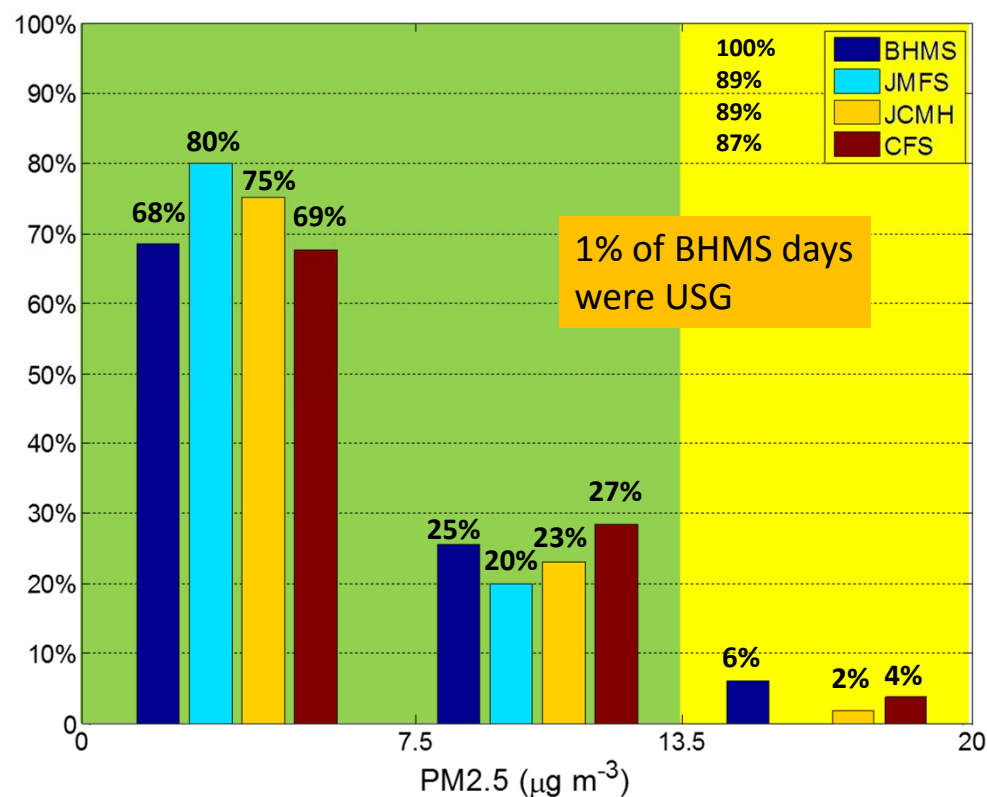
2 BHMS days were Unhealthy for Sensitive Groups

# Seasonal distribution

**Summer (184 days)**  
May, June, July, August, Sept, Oct



**Winter (181 days)**  
Nov, Dec, Jan, Feb, Mar, April



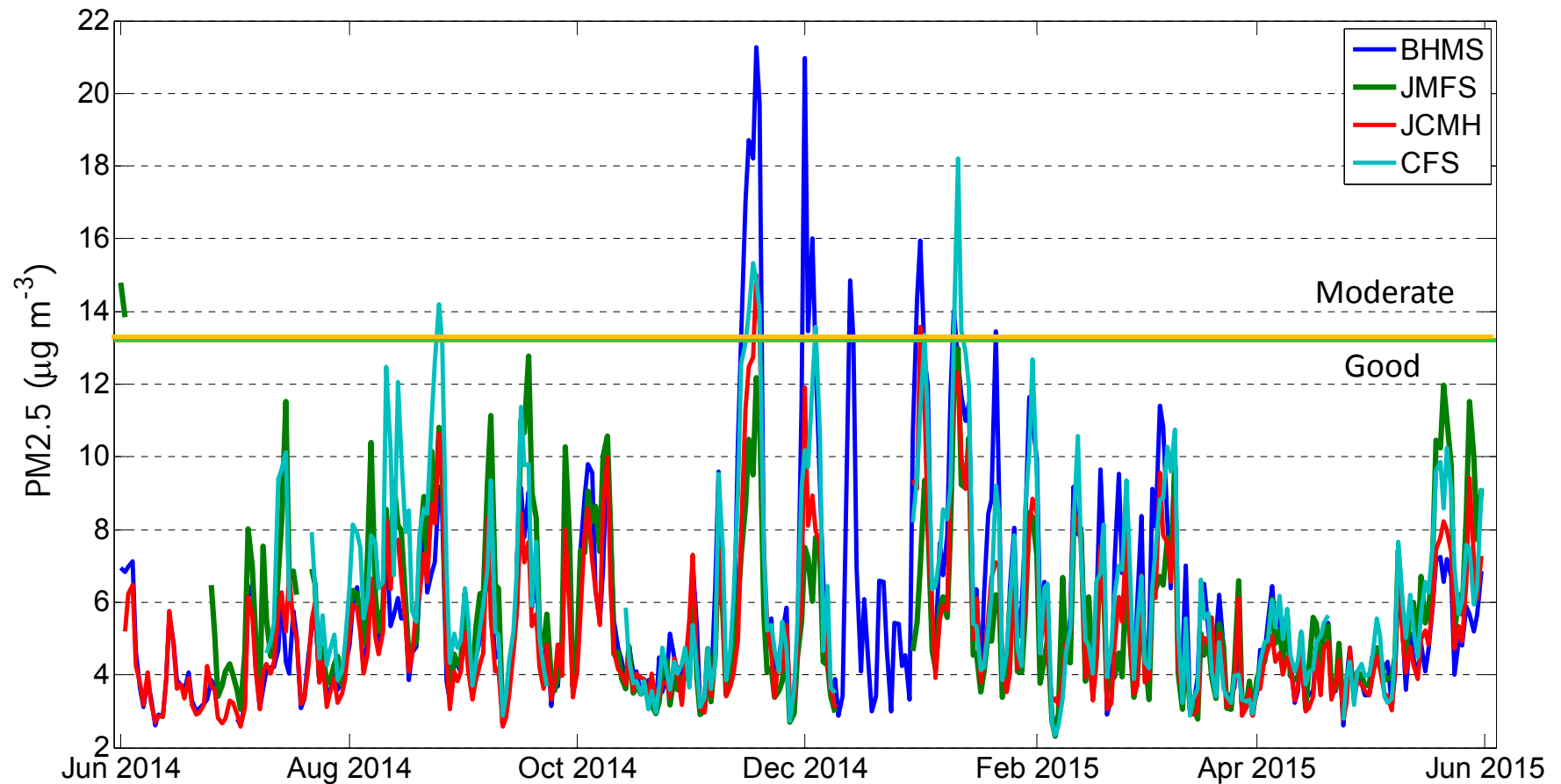


# What affects PM2.5 at our monitors?

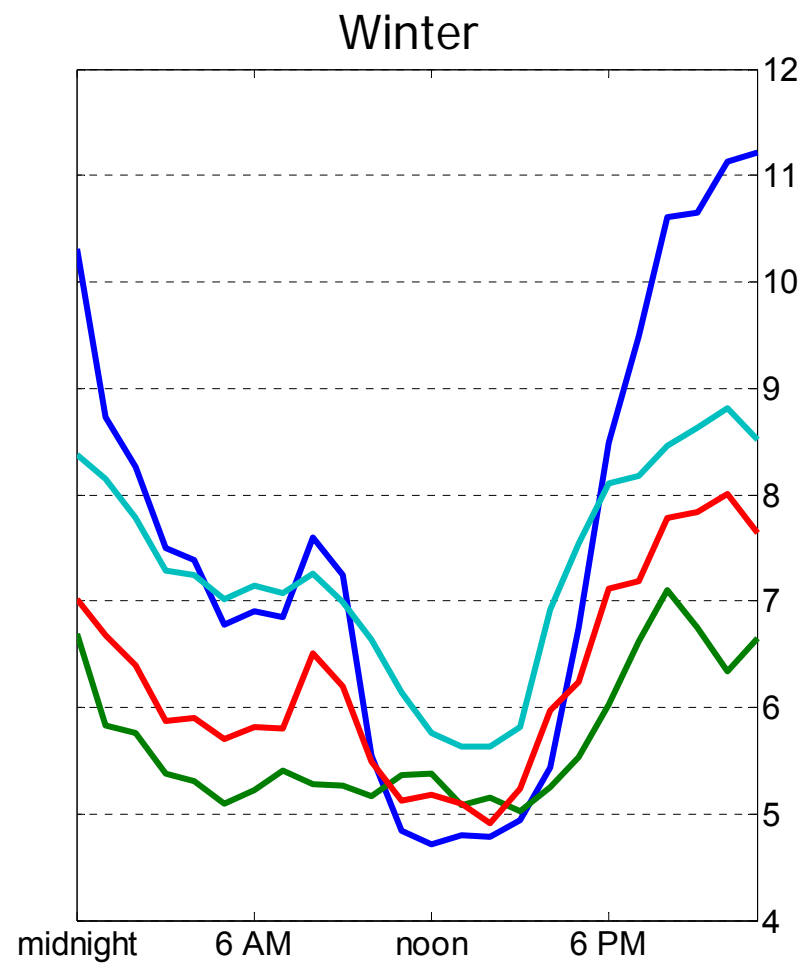
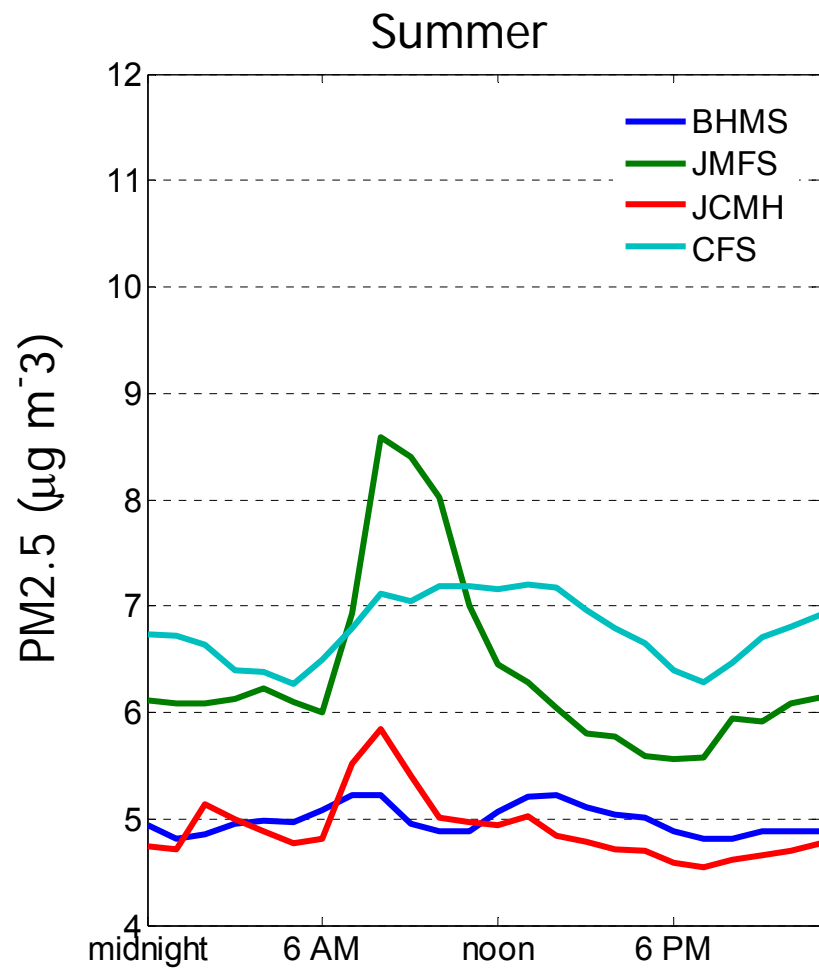
In this analysis we consider the following:

- Sources of pollution
  - Industry
  - Vehicles
  - Wood burning
- Strength of the source
- Placement of source relative to the monitor
- Wind direction
- Atmospheric stability
- Temperature

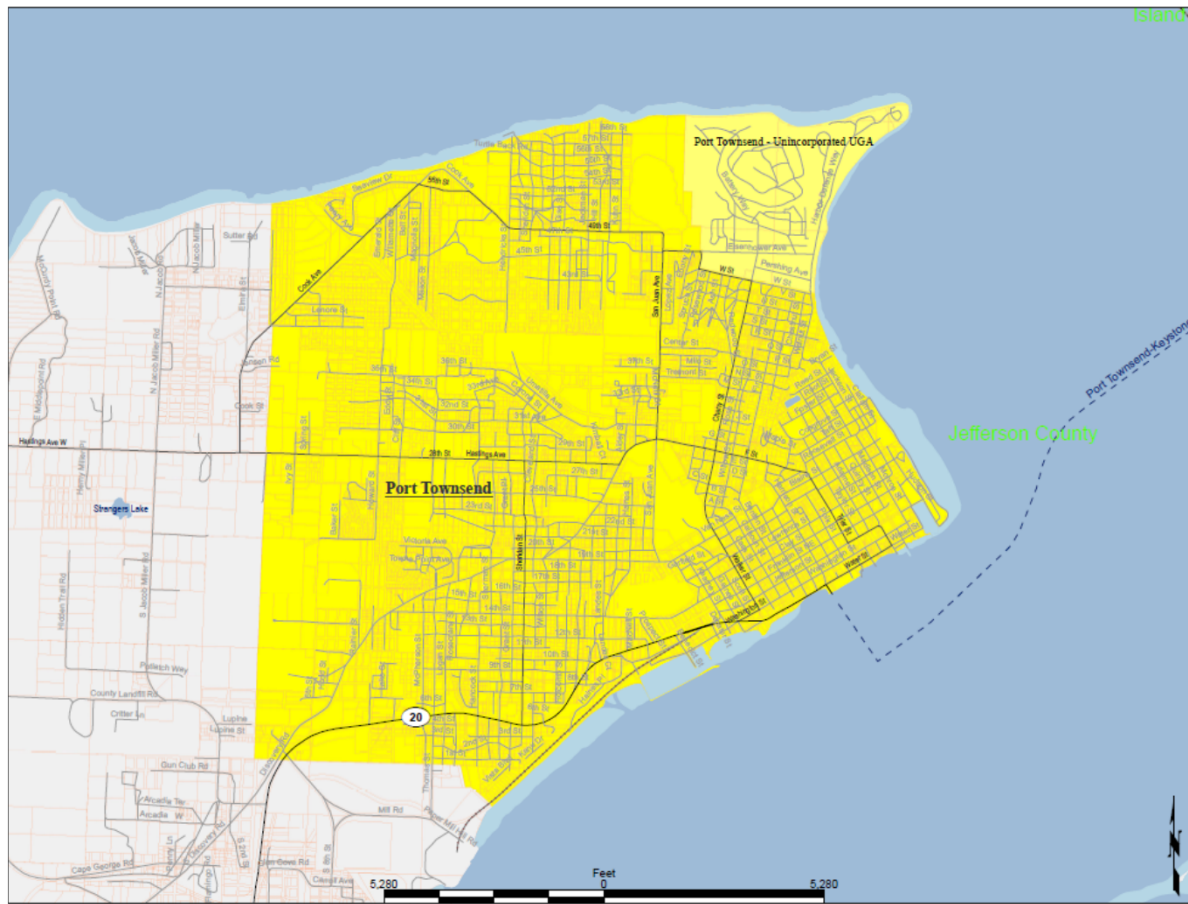
# Time series of daily PM2.5



# Average Hourly PM2.5



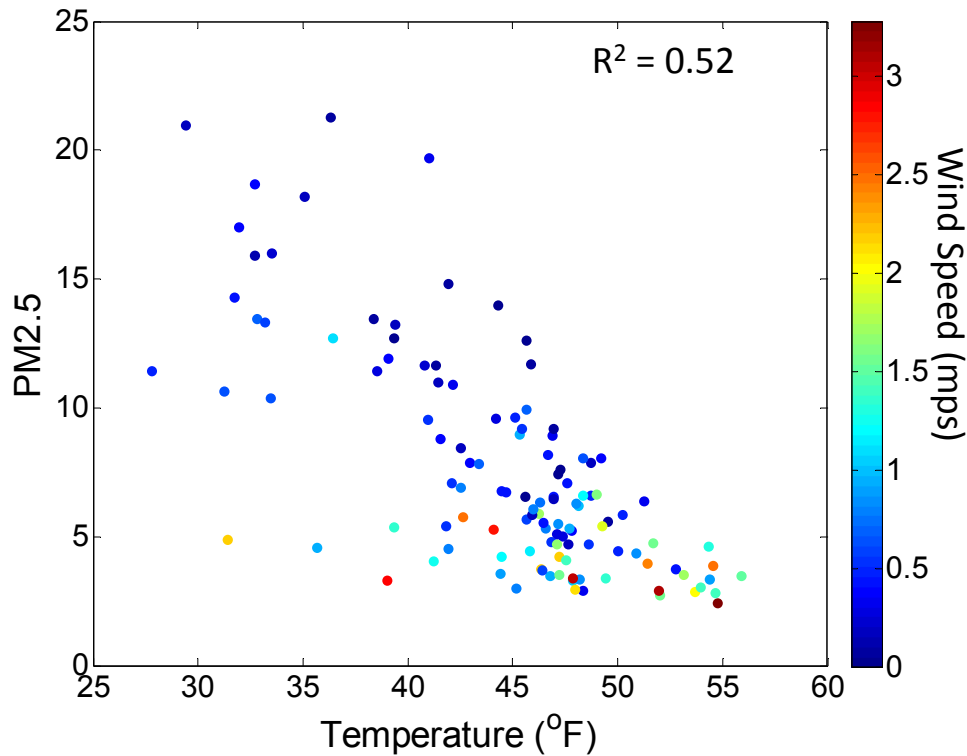
# Port Townsend Urban Growth Area



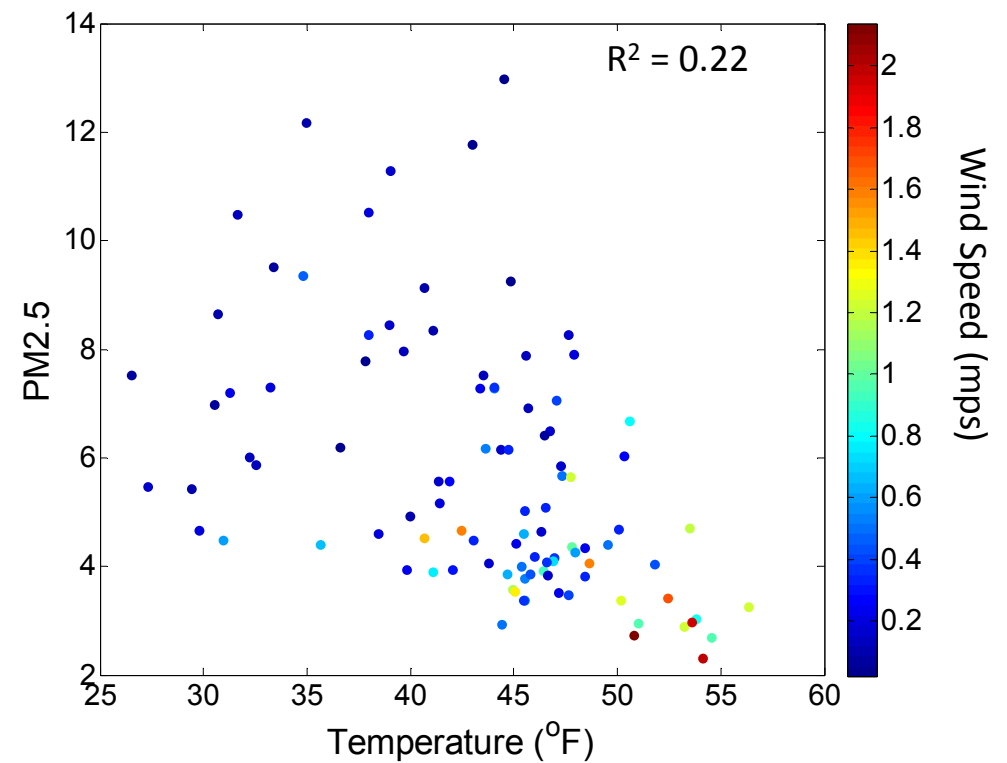
- Chimacum and Jacob Miller Fire Stations are outside the urban growth area and may be more affected by outdoor burning in the summer.
- Residential wood heat in the winter affects the entire region.

# Comparing daily PM2.5 to winter temp and wind speed

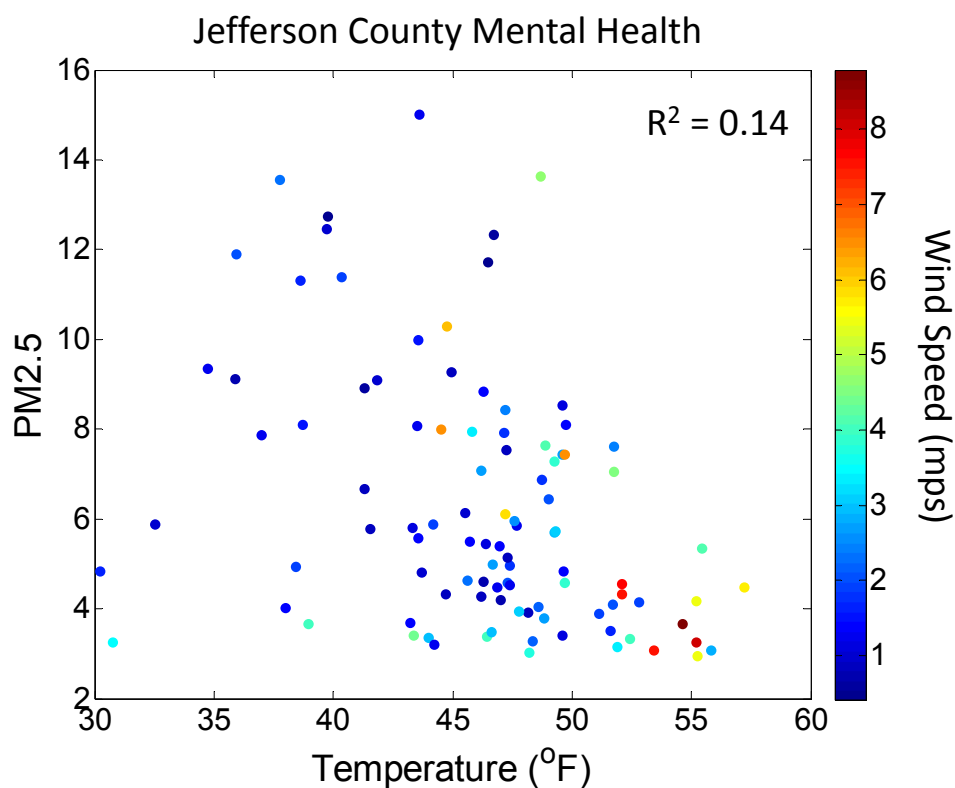
Blue Heron Middle School



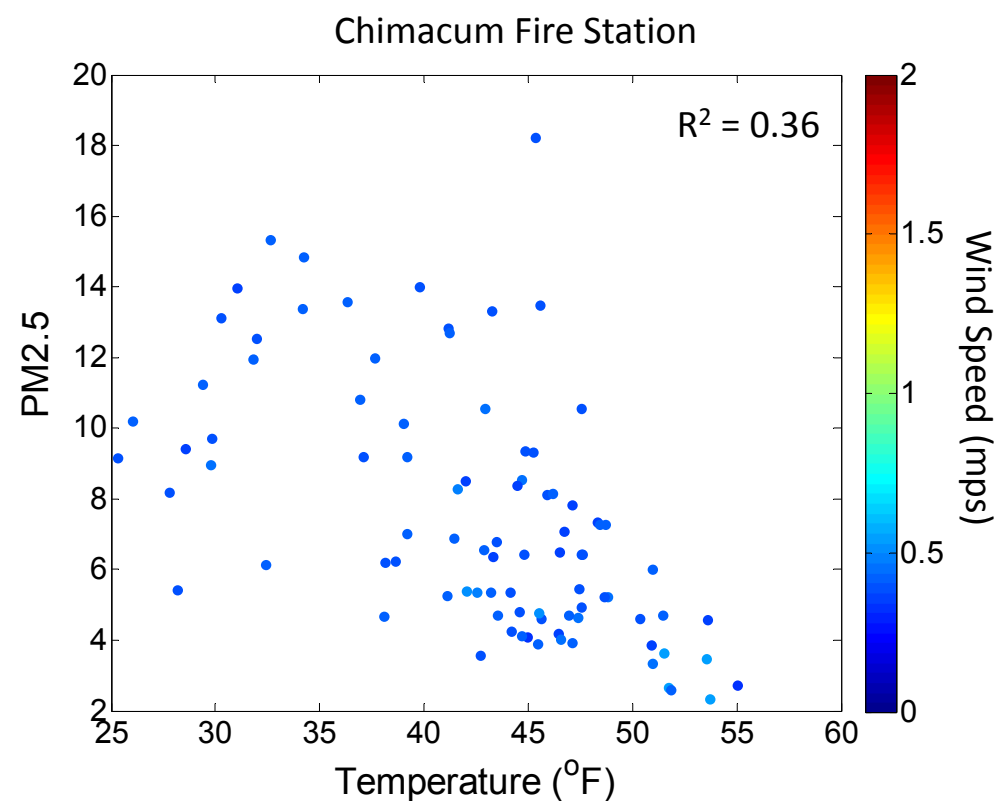
Jacob Miller Rd Fire Station



# Comparing daily PM2.5 to winter temp and wind speed



*Wind data from Port Townsend Paper*

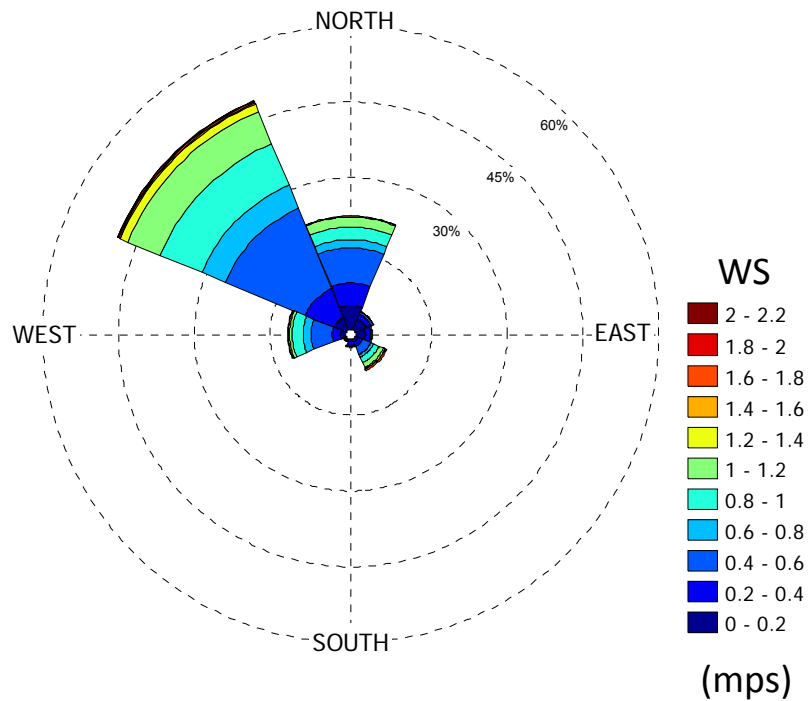


*Wind speed data from Chimacum are suspicious*

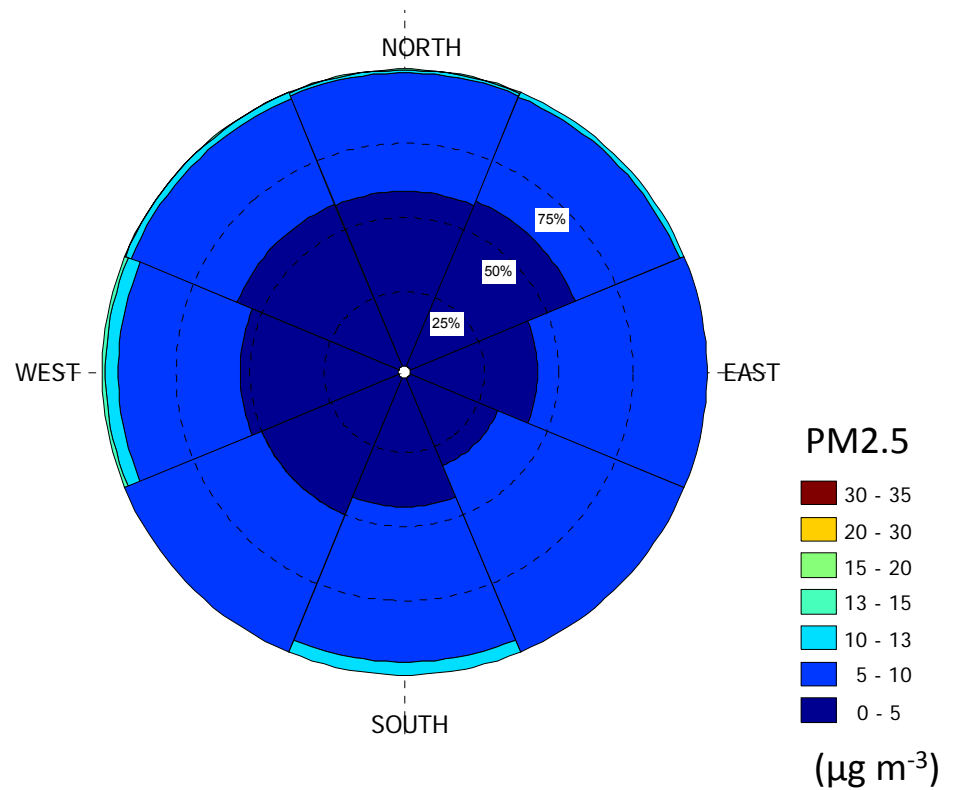


# Blue Heron Middle School – Summer (June, July, August)

Hourly wind direction frequency

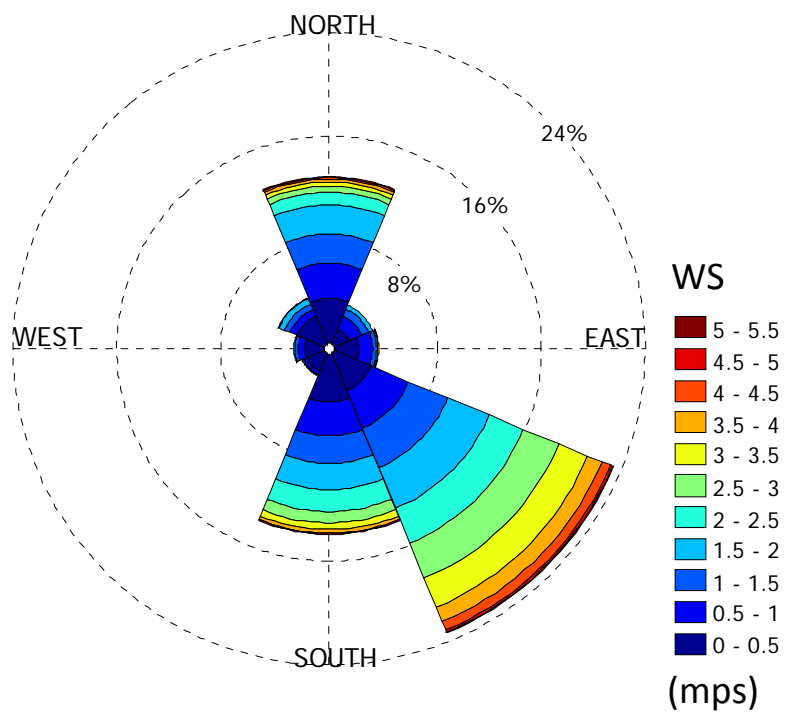


PM2.5 with respect to wind direction

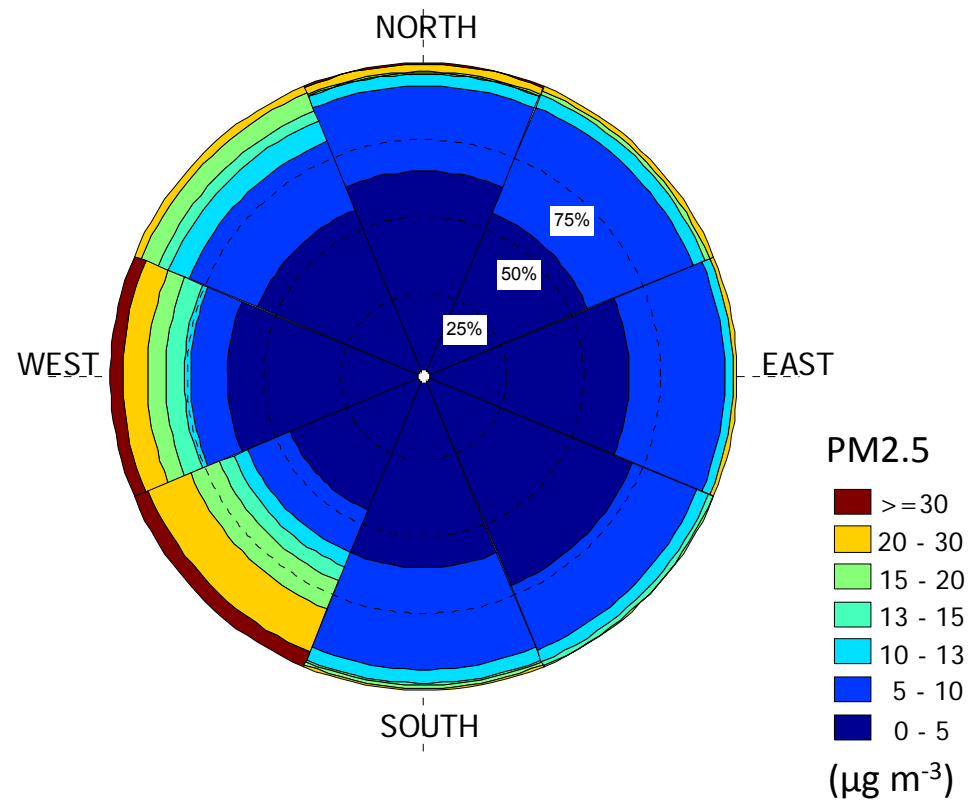


# Blue Heron Middle School – Winter (Dec, Jan, Feb)

Hourly wind direction frequency

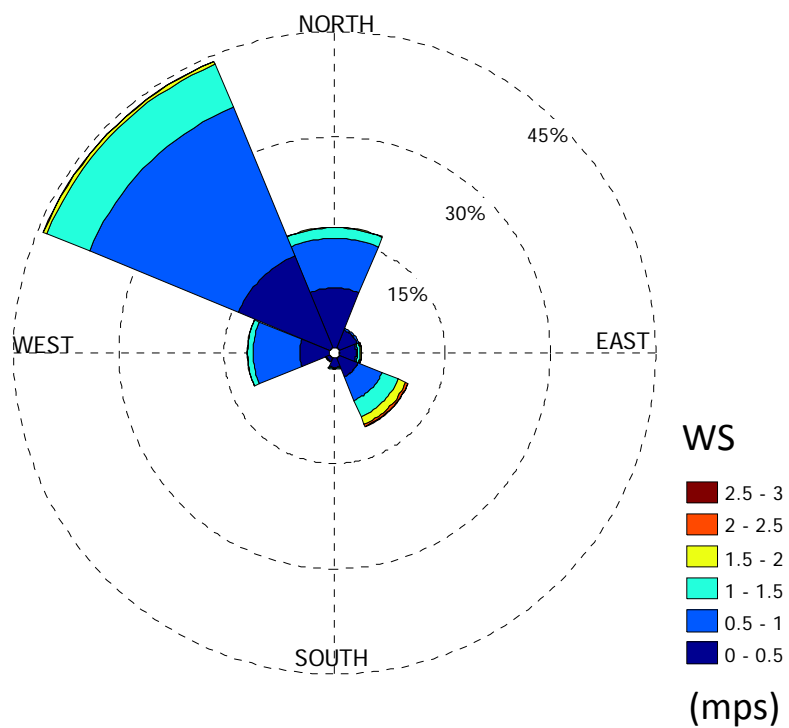


PM2.5 with respect to wind direction

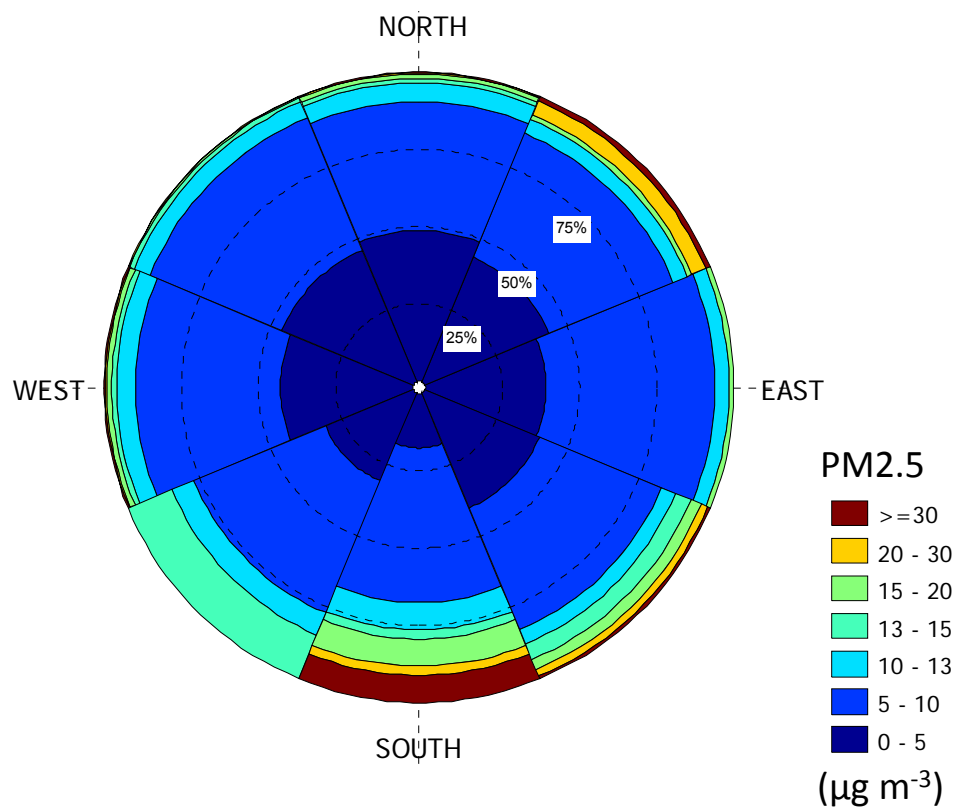


# Jacob Miller Fire Station – Summer (June, July, August)

Hourly wind direction frequency

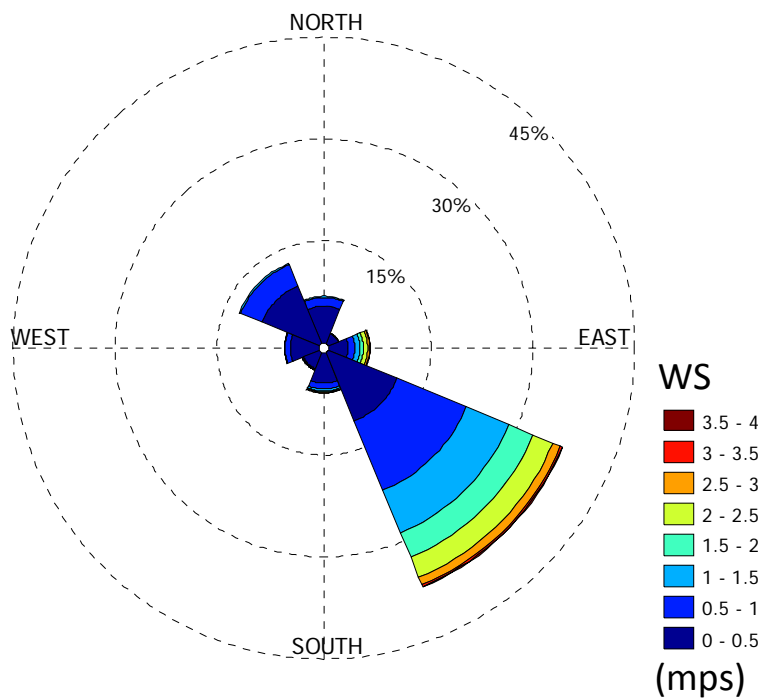


PM2.5 with respect to wind direction

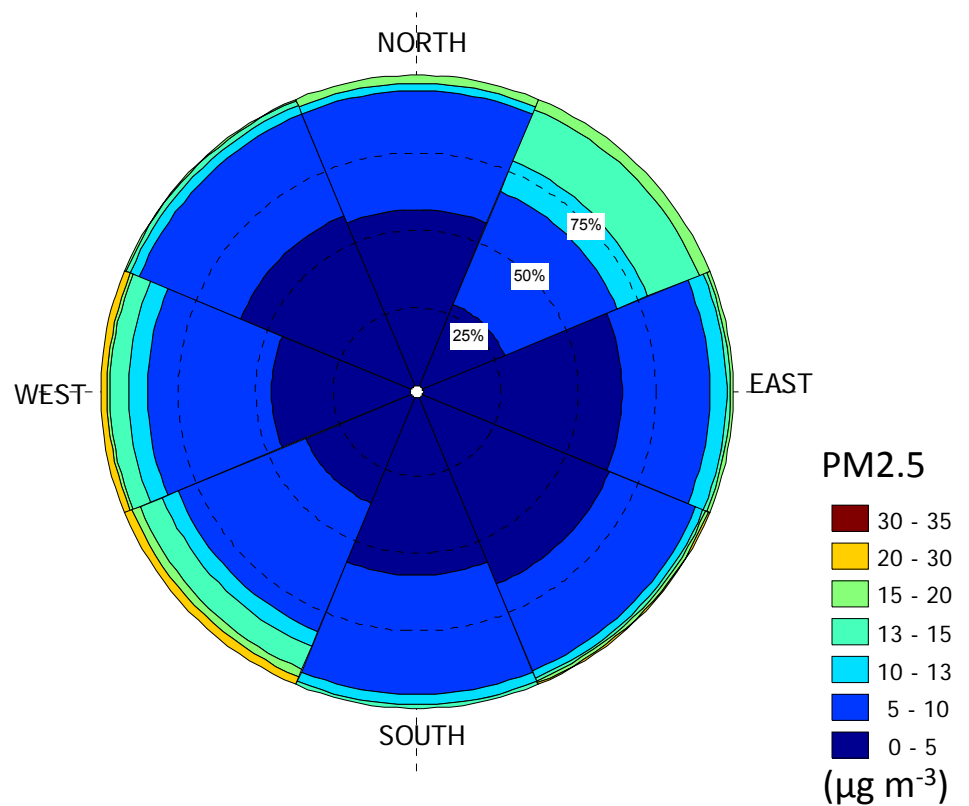


# Jacob Miller Fire Station – Winter ( Dec, Jan, Feb)

Hourly wind direction frequency

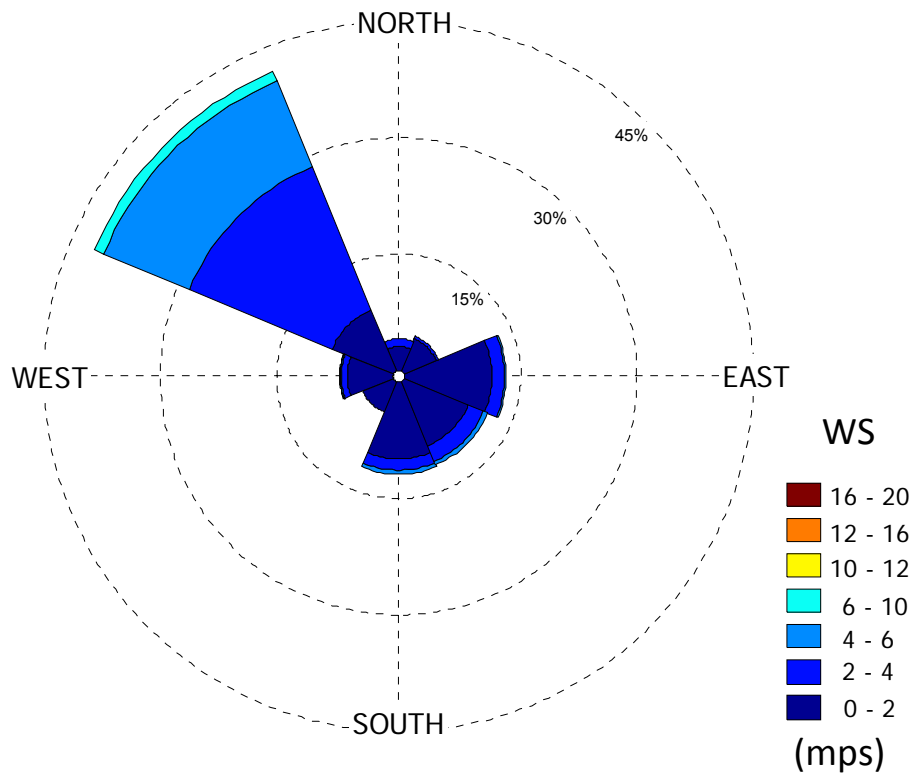


PM2.5 with respect to wind direction

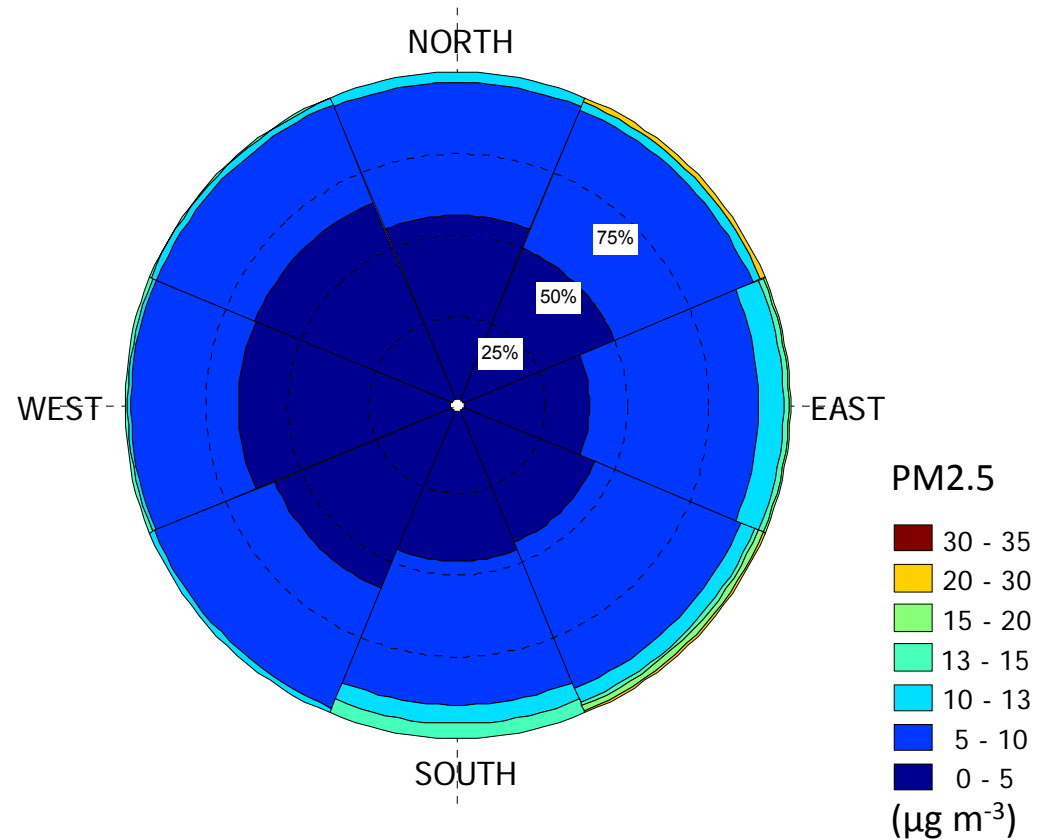


# Jefferson Co Mental Health – Summer (June, July, August)

Hourly wind direction frequency

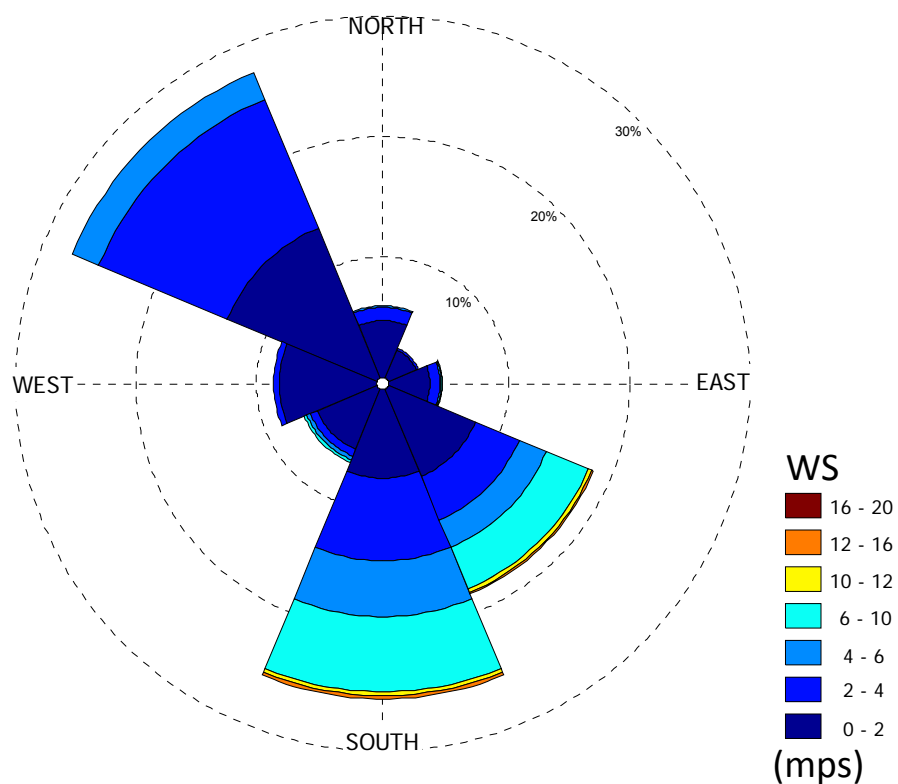


PM2.5 with respect to wind direction

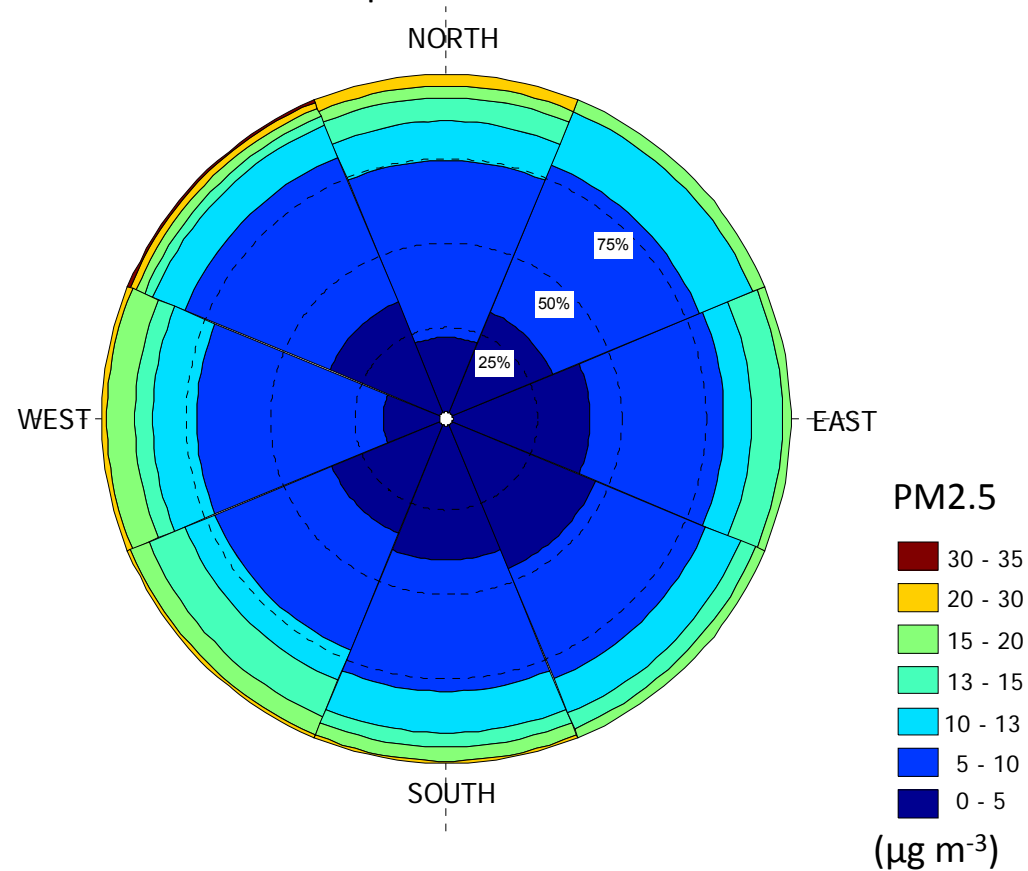


# Jefferson Co Mental Health – Winter (Dec, Jan, Feb)

Hourly wind direction frequency



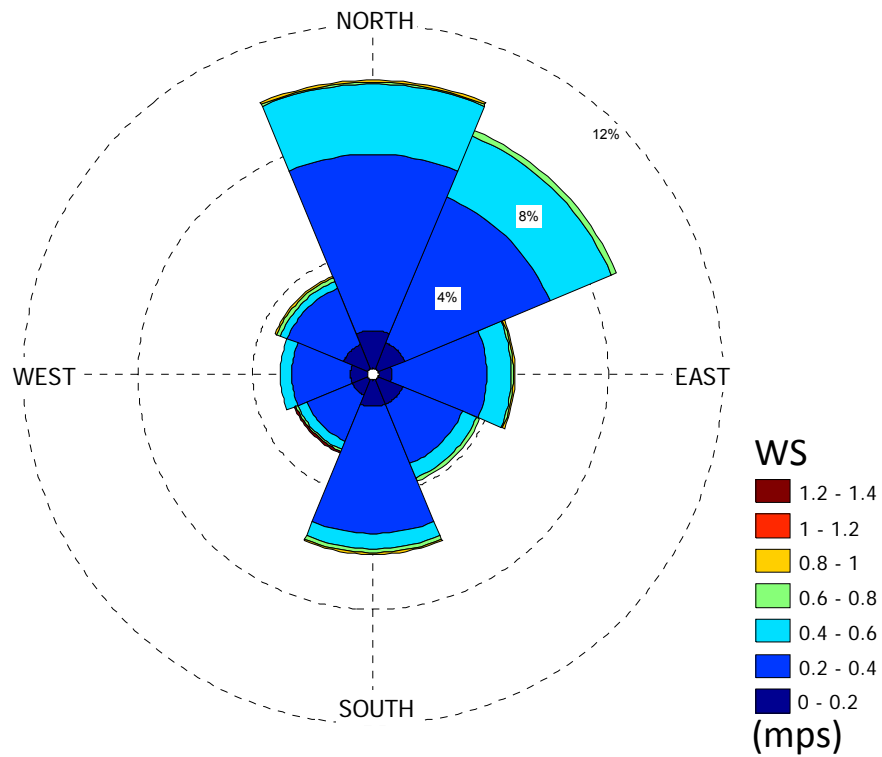
PM2.5 with respect to wind direction



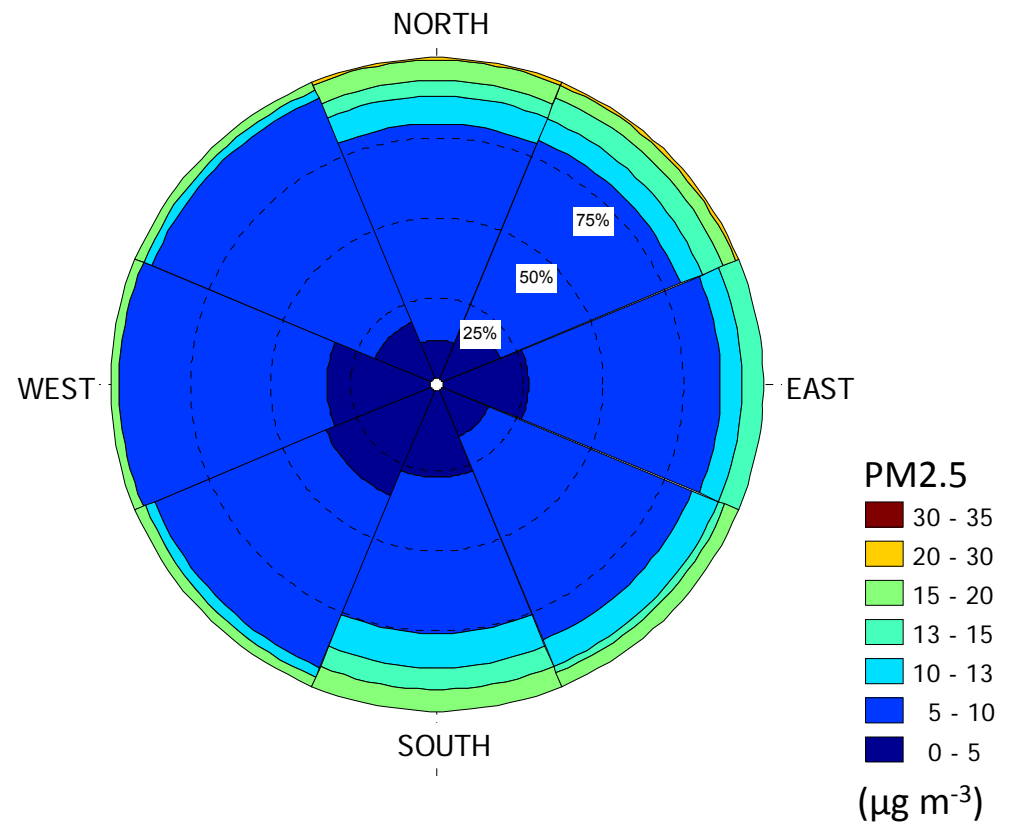


# Chimacum Fire Station – Summer (June, July, August)

Hourly wind direction frequency

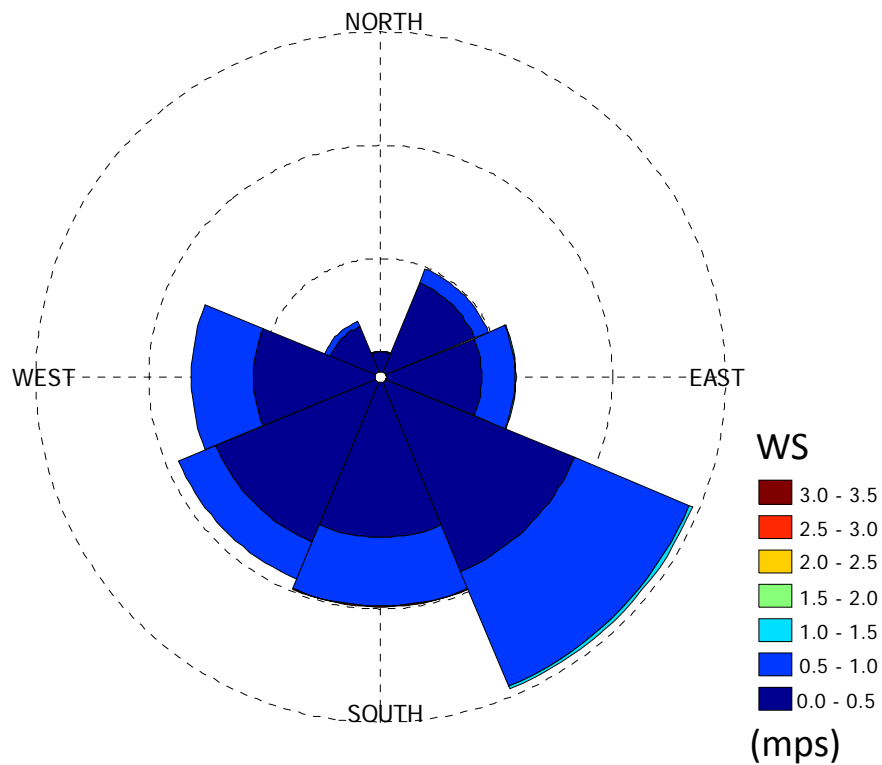


PM2.5 with respect to wind direction

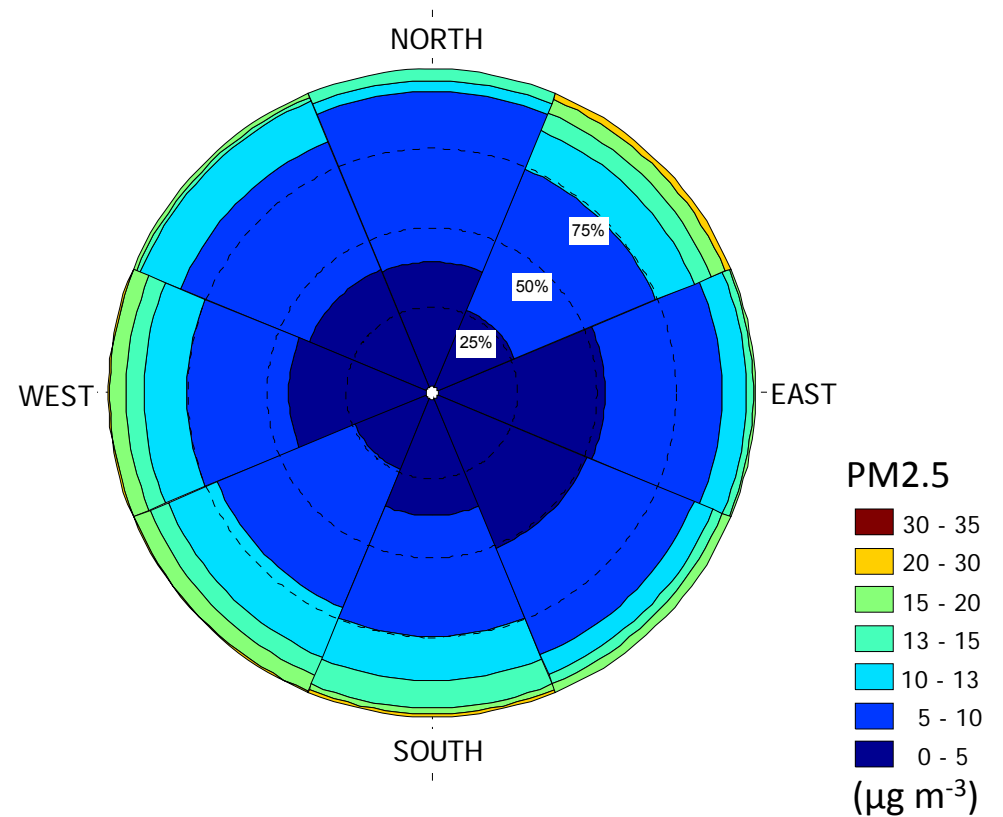


# Chimacum Fire Station – Winter ( Dec, Jan, Feb)

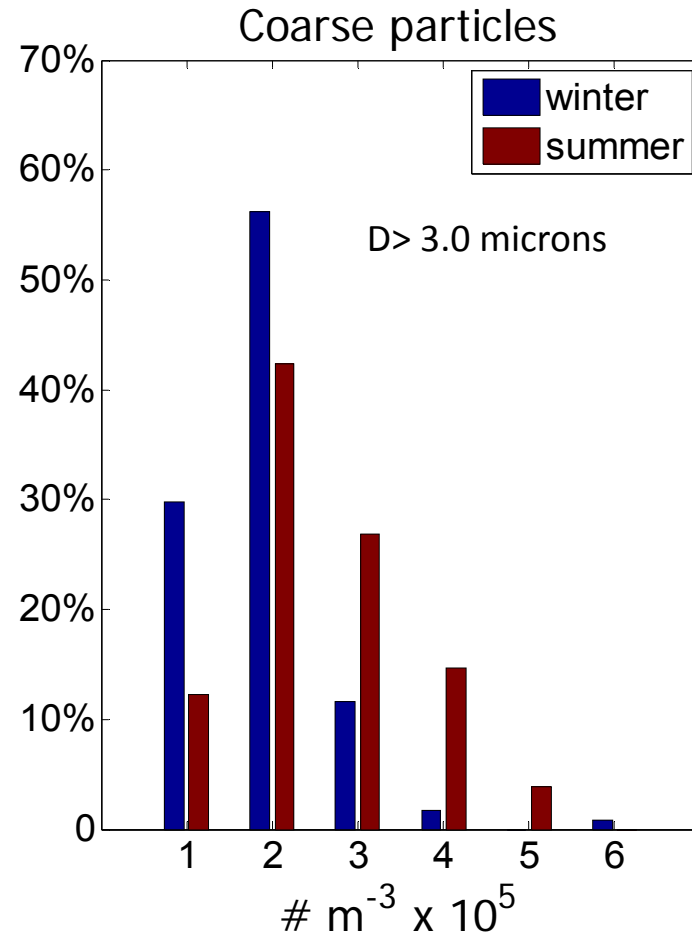
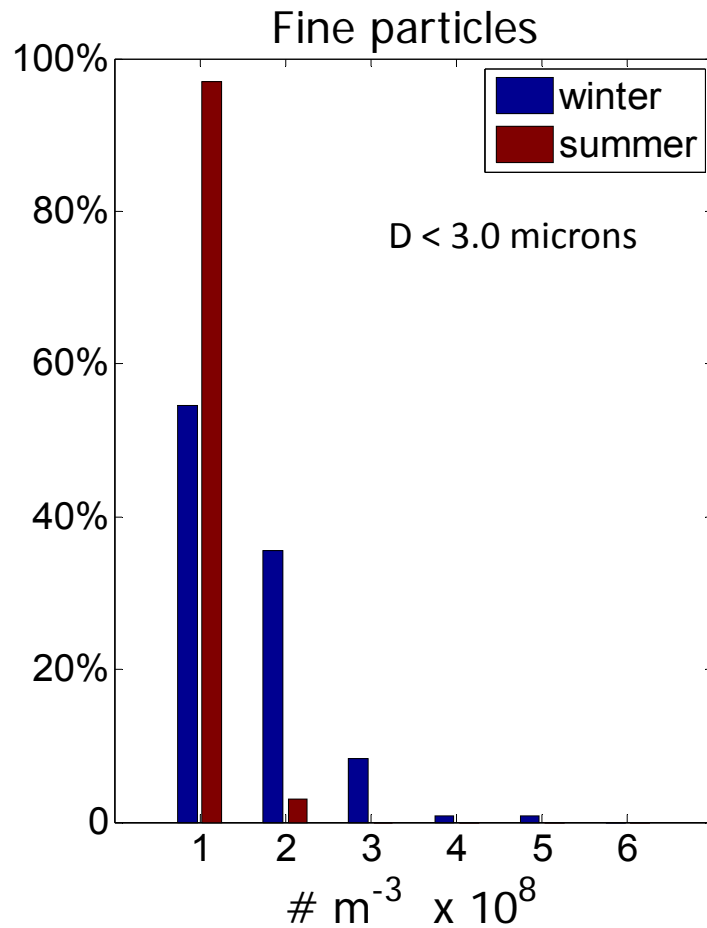
Hourly wind direction frequency



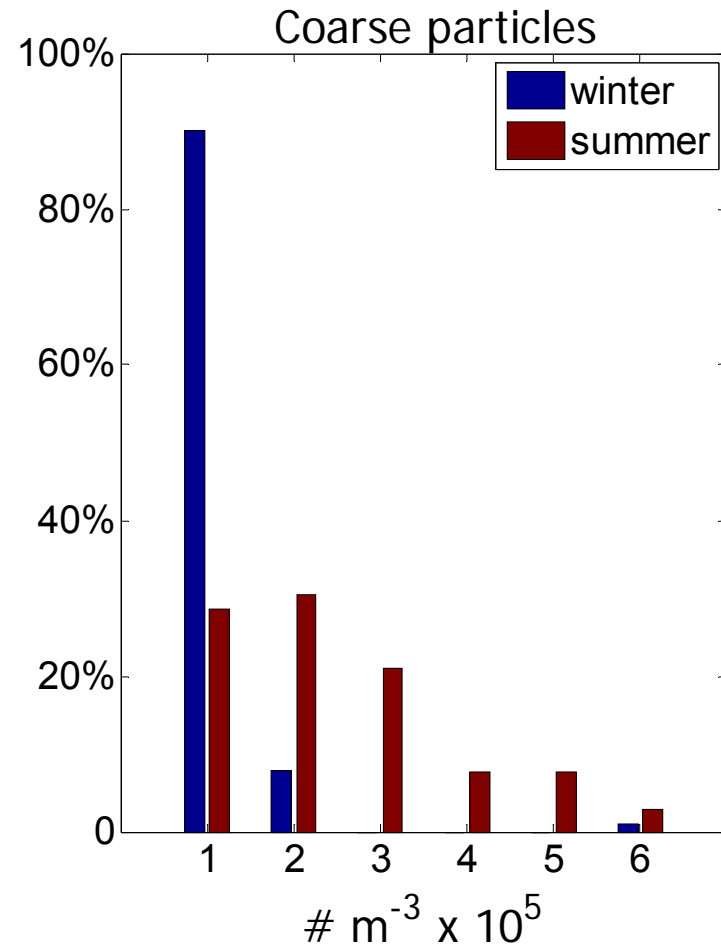
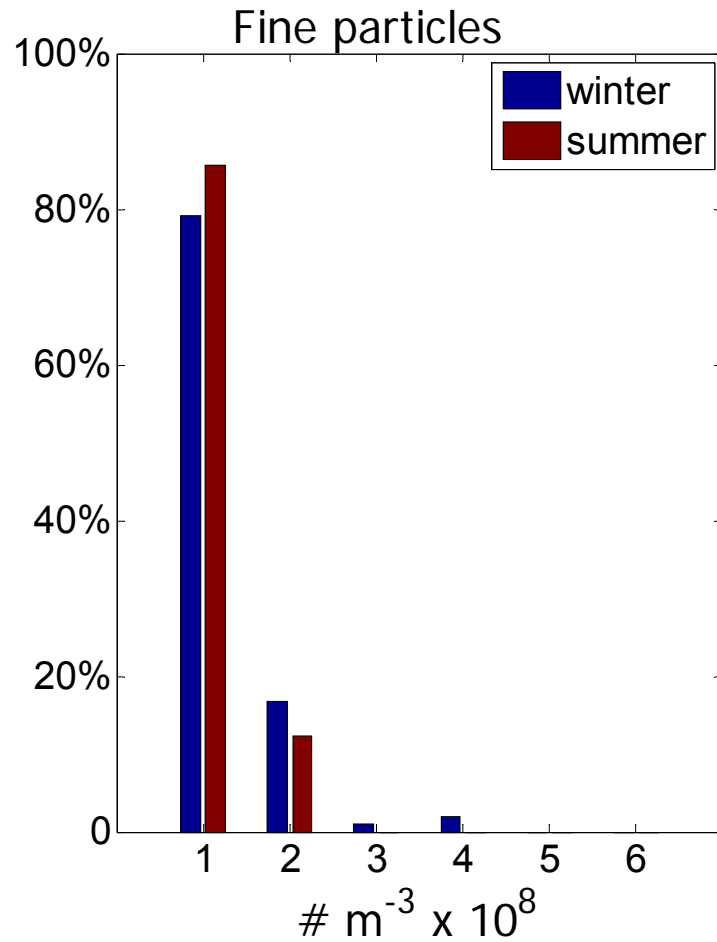
PM2.5 with respect to wind direction



# Relative Seasonal Size Distributions – BH MS



# Relative Seasonal Size Distributions – JM FS



## Summary:

- Air quality has generally improved in Port Townsend over the last 15 years
- Summer daily air quality is “good” over 98% of the time at all 4 monitor locations
- Winter daily air quality is “good” over 94% of the time at all 4 sites
- Residential wood burning contributes most significantly to impaired winter air quality
- Dust contributes significantly to summer time air pollution
- Outdoor burning may contribute to impaired air quality at monitoring locations outside the urban growth area.
- Effect of wind direction on air quality is inconclusive

# Jefferson County Air Monitor Placement

- Blue Heron Middle School is reasonably correlated with the other three sites
- The worst air quality days were observed at Blue Heron Middle School and with higher frequency
- ORCAA will continue to use Blue Heron Middle School as the best location for the permanent air quality monitor in Jefferson County