

Update on Ambient Air Monitoring in Lavington

Second Committee Meeting for Lavington Airshed Management

**Lavington Fire Hall
October 27, 2017**

**Tarek Ayache
Air Quality Meteorologist**

Introduction

- **MOE installed air monitoring station at Lavington Baptist Church in November 2015**
- **Hourly measurements of**
 - **fine particulate matter**
 - **wind speed & direction**
 - **temperature**
- **Full site operation since November 9th, 2015**

Introduction

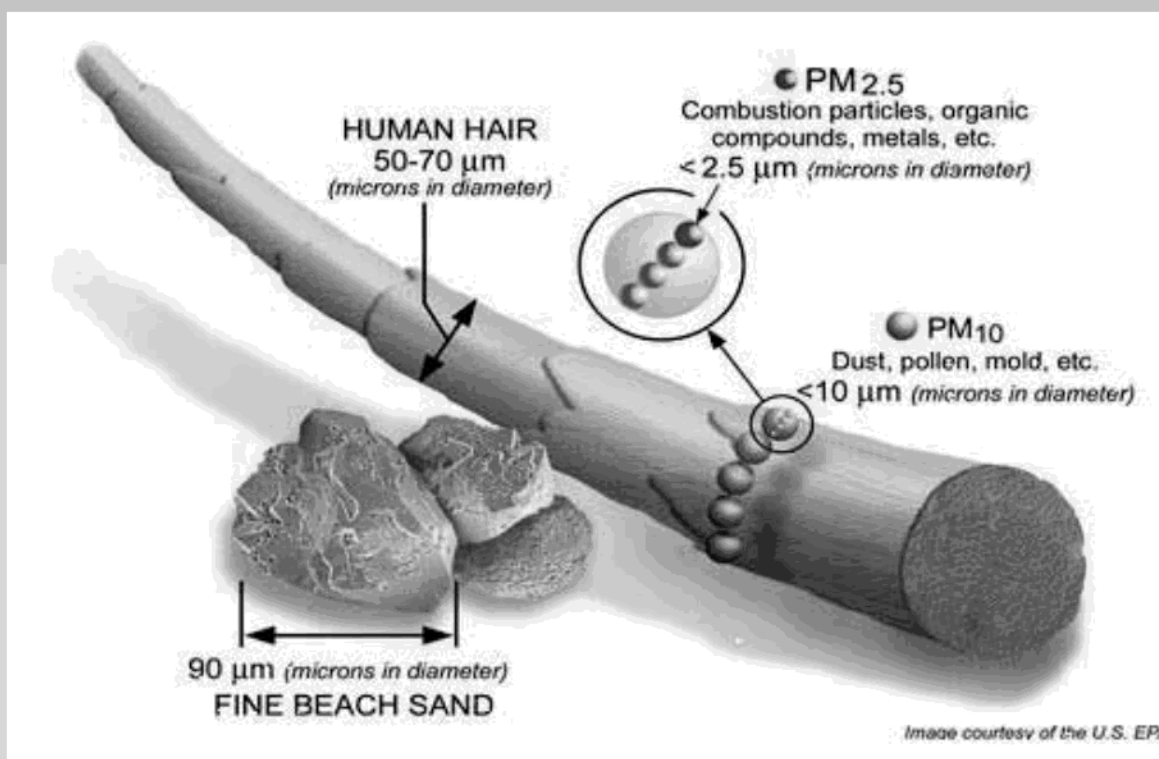
Objectives of air monitoring in Lavington:

- **Collect data to assess air quality in the community**
- **Determine relationship between air quality & weather conditions**
- **Investigate trends in air quality over time**
- **Inform environmental management decisions**

What is Particulate Matter?

- **Solid & liquid, various sizes & shapes, hundreds of chemicals**
- **Directly emitted or indirectly formed from gases**
- **Natural or manmade sources:**
 - **Fuel combustion, open burning, forest fires**
 - **Industries with crushing & grinding, construction**
 - **Roads, unpaved surfaces**
 - **Agriculture**

What is Particulate Matter?



Coarse: PM₁₀

hours to days

Fine: PM_{2.5}

days to weeks

Effects of Particulate Matter

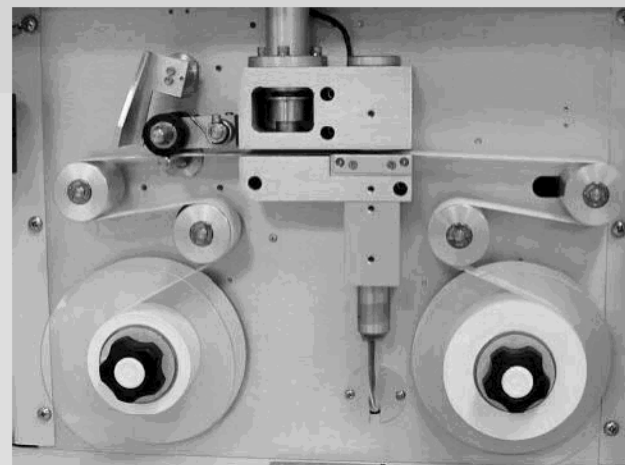
- **Visibility impairment**
- **Can get deep into lungs, even bloodstream**
- **The smaller its size, the worse are health effects → PM_{2.5}**
- **Short-term exposure: associated with increased hospitalizations and/or mortalities due to cardiovascular & respiratory causes**
- **Long-term exposure: can lead to heart or lung diseases, increases relative risk of mortality from lung cancer & cardiopulmonary diseases**

PM_{2.5} Sources in Lavington

- **Industrial emissions**
- **Wood heating**
- **Vehicles**
- **Open burning**
- **Wildfires**

Monitoring Instrumentation

- Beta Attenuation Monitor – BAM 1020
 - Housed in enclosure with heater & air conditioner to control temperature & humidity
 - Each hour, beta rays emitted through clean spot of filter tape for zero reading
 - Spot advanced to sample nozzle where PM air is sampled onto the filter tape
 - At hour's end, dirty spot re-measured with rays
 - Difference between 2 attenuation measurements converted to PM mass
- Temperature, wind speed & direction
- Data communication by modem
- Calibration, maintenance & auditing



Data Analysis

- **January 1st to December 31st 2016**
- **Data capture:**
 - 75% completeness for each calendar day, quarter, year
- **Time averaging:**
 - Hourly
 - Daily: midnight to midnight
 - Running: every hour, mean over past 24 hours
 - Annual

Data Analysis

- **Air Quality Objectives**
 - Acceptable limits on air contaminants
 - Established to protect human health and the environment
 - Not considered as thresholds we can “pollute up to”, but as levels to stay well below
- **BC AQOs are non-statutory limits used for**
 - Gauging current and historical air quality
 - Guiding environmental impact assessments & authorizations
 - Guiding airshed planning efforts
 - Informing regulatory development
 - Episode management strategies such as air quality advisories

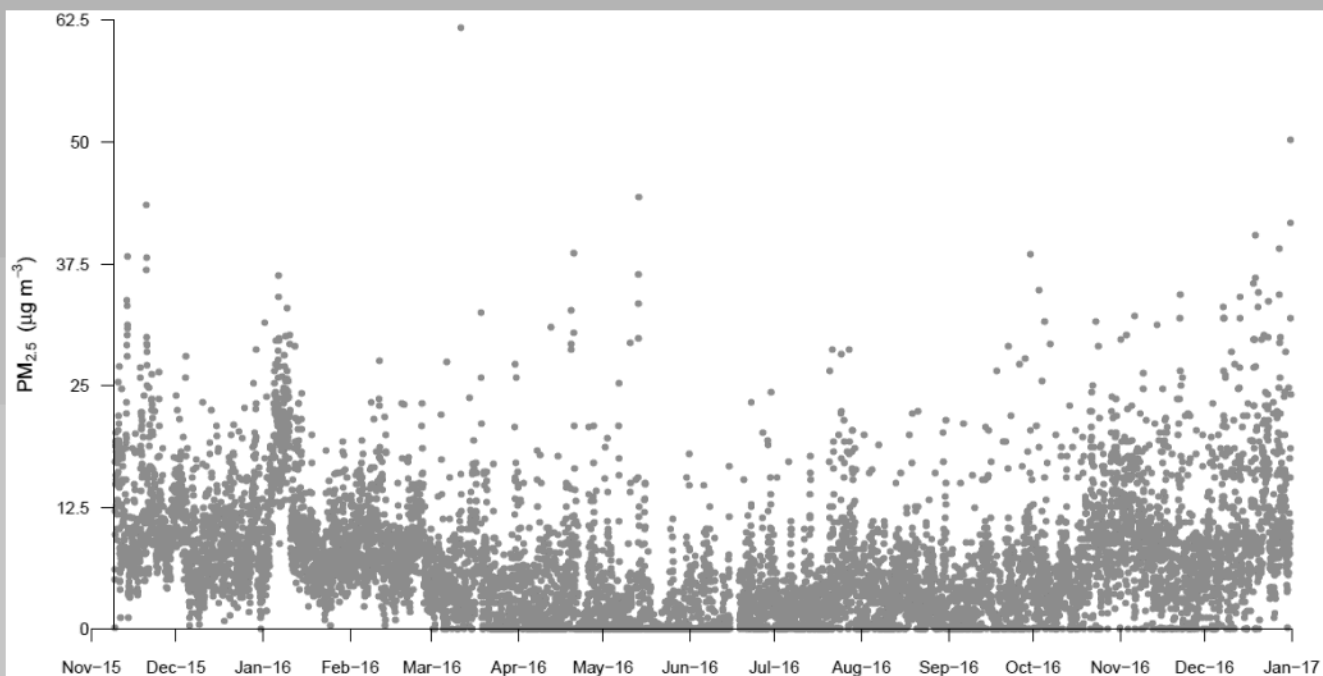
Data Analysis

Averaging Period	BC AQOs	Federal CAAQS
24 hours	25 µg/m ³	28 µg/m ³
1 year	8 µg/m ³	10 µg/m ³

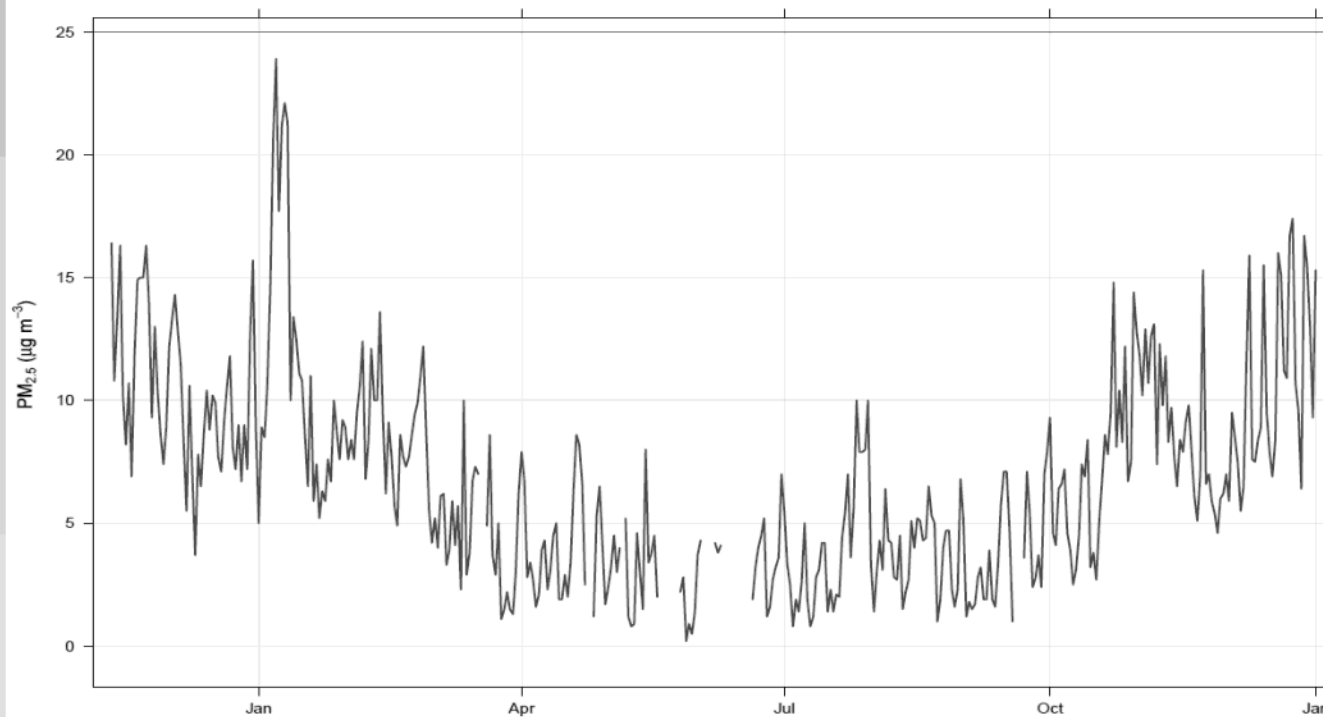
- For air quality management in an airshed with PM_{2.5} monitoring
 - One-year average below the annual AQO
 - 98th percentile of daily averages over a year below the 24-hr AQO
 - Minimal number of days in a year with average concentrations exceeding the 24-hr AQO
 - Advisories issued whenever the 24-hr running average exceeds the 24-hr AQO, and exceedance is expected to last for some time



Hourly Average



Daily Average



Data Capture

Station	Valid Hours	Completeness
Lavington	8120	92.6 %
Vernon	8661	98.8 %

Hourly Statistics

Station	Annual Mean	Hourly Maximum	Run-Mean Maximum	Run-Mean Hours > 25
Lavington	6.2	62	24.3	0
Vernon	6.7	74.4	25.8	5

* Units in $\mu\text{g}/\text{m}^3$

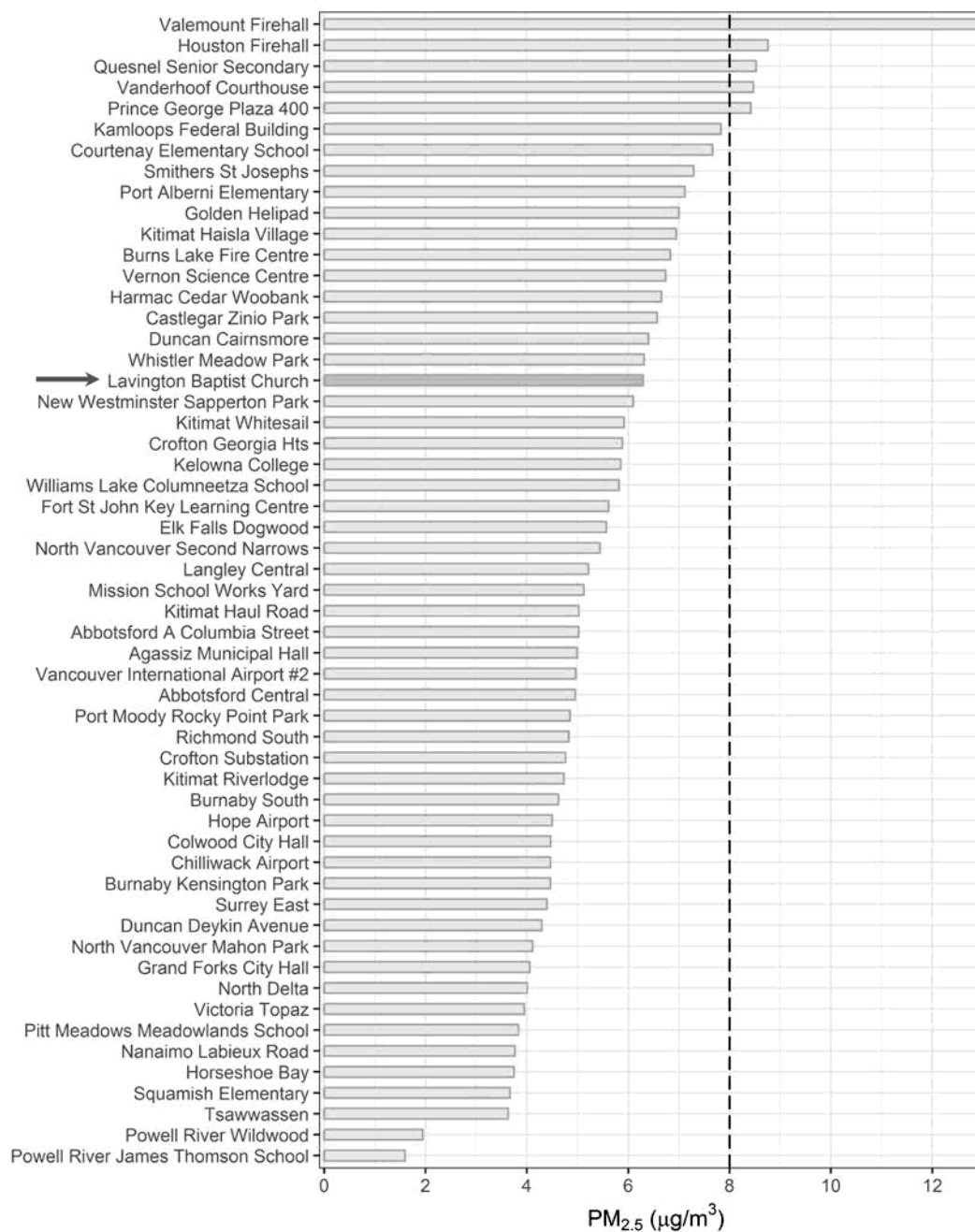
Daily Statistics

Station	98 th Percentile	Maximum	Days above 25
Lavington	16.8	23.9	0
Vernon	16.7	22.2	0

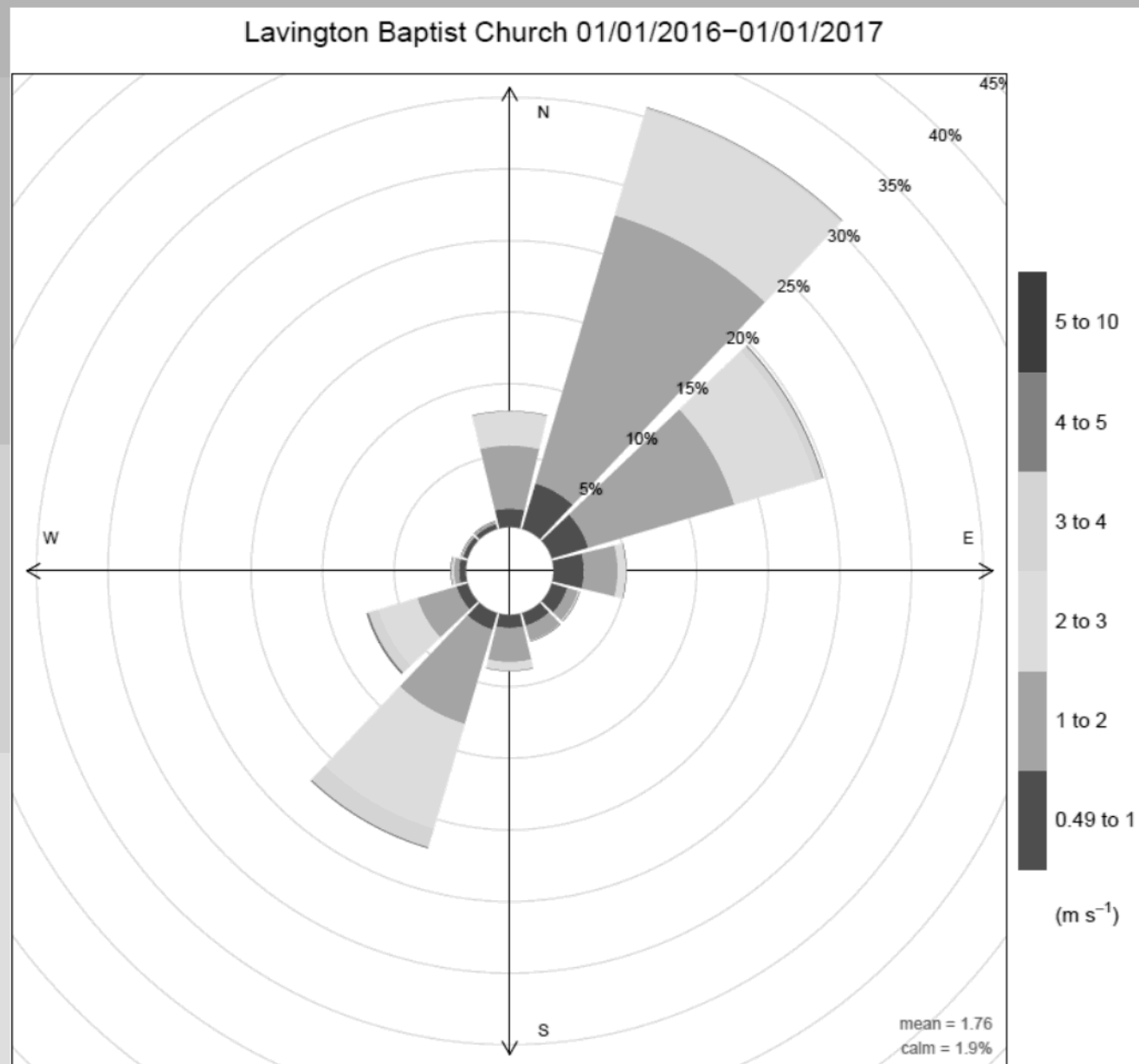
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2016 Annual Average PM_{2.5} in British Columbia

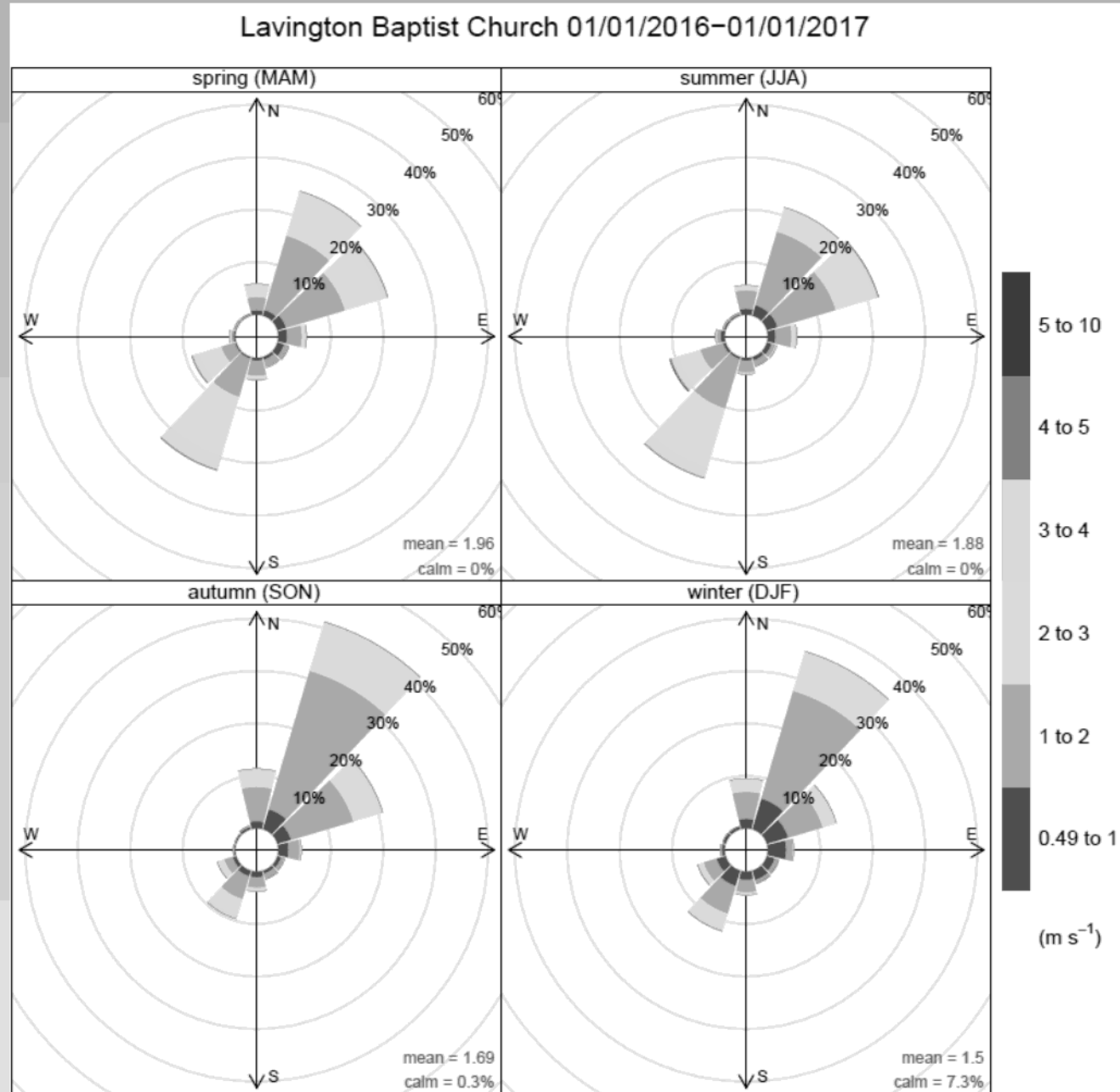
BC Annual Objective = 8 µg/m³



Annual Wind Pattern



Seasonal Wind Patterns



Day-Night Wind Patterns

