# NAPS PM 2.5 Plots 2003-2019

## Introduction

The data used in this document was obtained for 2003-2019 from Environment Canada's National Air Pollution Surveillance Program (NAPS) (EC NAPS Data Website). As of May 5, 2021, the data for 2020 has not be uploaded.

The following document reproduces the work by Dabek-Zlotorzynska et al. (2011) and extends the analysis to 2019. The document begins by outlining the NAPS stations and available data. Then the number of daily observations per site are used to calculate a dividing date - the date that approximately divides the total observations in half. Plots are constructed to present the data before and after the dividing date.

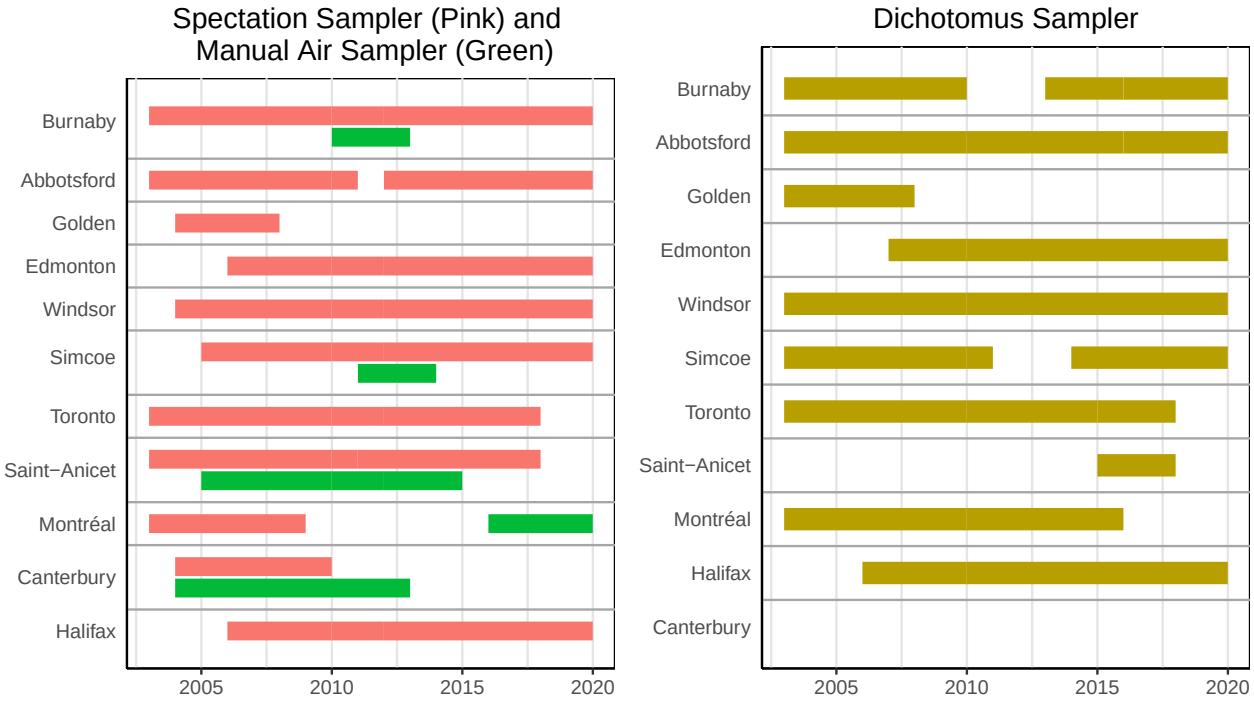
## Summary of cities and change of stations

The following table summarizes the available spectation data for the selected sites. Information on the NAPS stations was found at the following link; NAPS Station Information

| Station | Summary of spectation data | Change of Stations |
|---|---|---|
| Burnaby (S100119 | Data for all years | No |
| Abbotsford (S101004) | Missing in 2011 | Station changed from S101004 (2003 - 2010) to S101005 (2012+) |
| Golden (S103202) | Data from 2004-2007 | No information on station closing/changing |
| Edmonton (S90132) | Missing from 2003-2005 | No |
| Windsor (S60211) | Missing in 2003 | No |
| Simcoe (S62601) | Missing 2003-2004 | No |
| Toronto (S60427) | Missing after 2018 | Station changed from 60427 (2003-2014) to 60439 (2015 - 20/06/2019) to 60445 (21/06/2019 +). Stations 60439 and 60445 were open in 2019 but are missing PM25 |
| Saint-Anicet (S54401) | Missing after 2018 | No |
| Montréal (S50104) | Missing after 2008 | Station changed from 50104 (2003-2008) to 50134 (2008+). New station does not collect PM 2.5 spec |
| Canterbury (S40801) | Missing after 2009 | Stopped site in 2014, did not combine with another station |
| Halifax (S30113) | Station opened in 2006 | Station was combined with 30118 (1990-2018) but did not measure PM 2.5 spec |

## Timeline of stations

The following plot shows the timelines of the available NAPS data for the three different sampler types (spectation, dichotomus and PM 2.5 air).




## Finding the cutoff date

Using six month increments, the dividing date was determined as; 2010-01-01. The following table presents the number of samples before and after the calculated date.

| City | Number samples before cutoff | Number samples after cutoff | Percent before cutoff | Percent after cutoff |
|---|---|---|---|---|
| Abbotsford | 769 | 786 | 0.49 | 0.51 |
| Burnaby | 853 | 890 | 0.49 | 0.51 |
| Canterbury | 493 | 123 | 0.80 | 0.20 |
| Edmonton | 473 | 1296 | 0.27 | 0.73 |
| Golden | 440 | 0 | 1.00 | 0.00 |
| Halifax | 265 | 1319 | 0.17 | 0.83 |
| Montréal | 715 | 594 | 0.55 | 0.45 |
| Saint-Anicet | 873 | 719 | 0.55 | 0.45 |
| Simcoe | 587 | 1236 | 0.32 | 0.68 |
| Toronto | 967 | 853 | 0.53 | 0.47 |
| Windsor | 498 | 1287 | 0.28 | 0.72 |

The average of the percent before cutoff column is 0.5 and the percent after cutoff column is 0.5.

**Total $PM_{2.5}$ mass by site**


Figure 1: Total $PM_{2.5}$ mass (Median, 25th and 75th percentile, 2nd and 98th percentile)

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## Monthly mean $PM_{2.5}$ mass by site

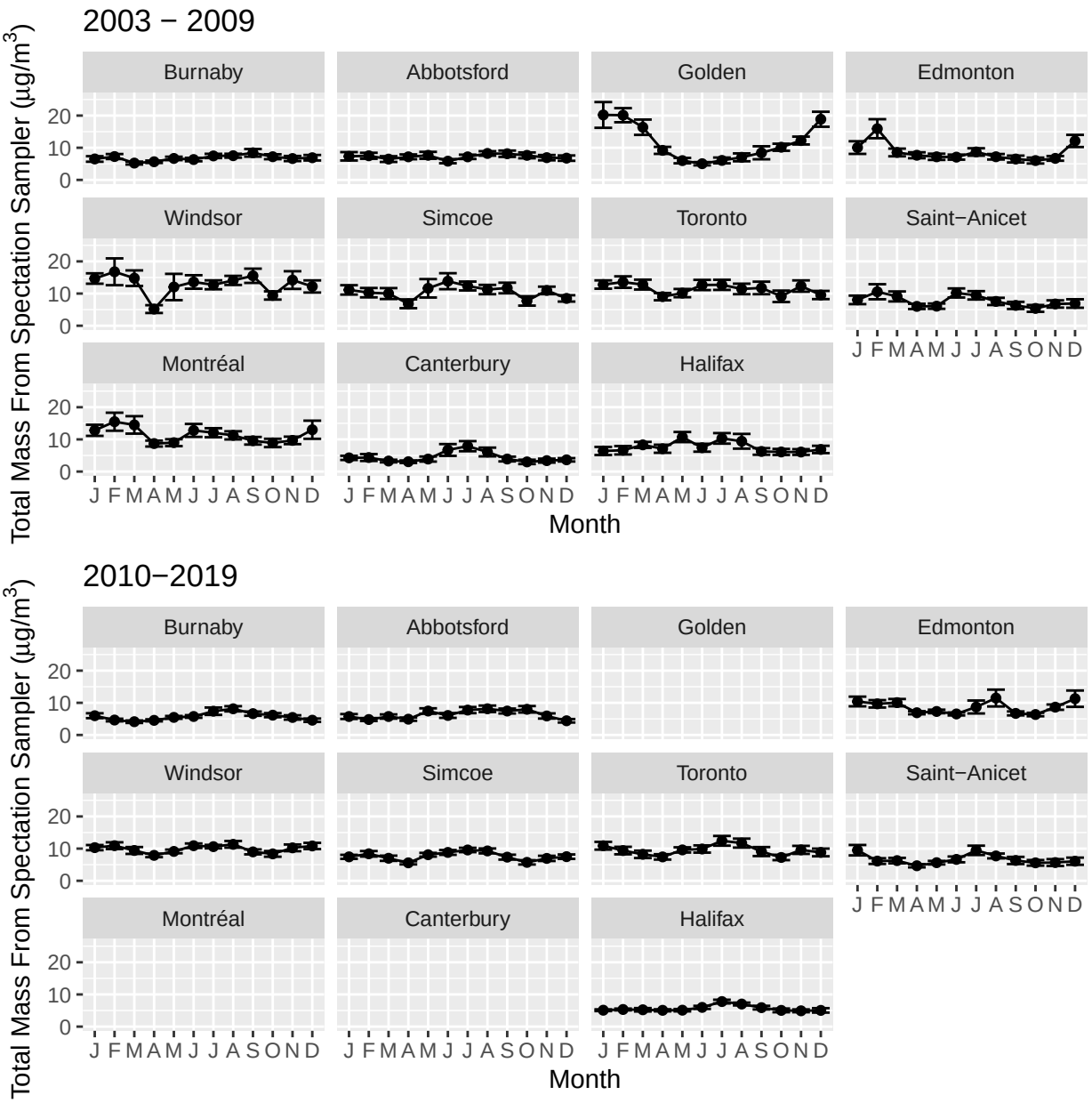


Figure 2: Monthly mean $PM_{2.5}$ (Mean and 90th percent CI)

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## Mean organic carbon (OC) by site

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## Reconstructed $PM_{2.5}$ mass by major component and site

When calculating the major components, observations from the spectation sampler were used. For a given day, if the spectation observations were missing, and the site had pm 2.5 sampler observations (PM2.5 Manual Air Sampler) was used. This affected the observations for Montreal and Canterbury from 2010-2019.

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## Reconstructed $PM_{2.5}$ mass by 10 highest mass days and site

To generate the following figure, the days with the largest $PM_{2.5}$ mass that had observations for all reconstructed components were used. (i.e. there were days that had larger masses than used, but were missing observations)

For 2010-2019, Golden, Montreal and Canterbury contained at least one missing observation each day.

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## Median ammonium sulphate and ammonium nitrate concentrations by site and month

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## Median elemental carbon (EC) and organic matter (OM) concentrations by site and month

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## Median soil and sodium chloride concentrations by site and month

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## Ammonia mixing ratio by site and month

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## Median sulphur dioxide mixing ratio and nitric acid concentrations by site and month

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## References

Dabek-Zlotorzynska, Ewa, Tom F. Dann, P. Kalyani Martinelango, Valbona Celo, Jeffrey R. Brook, David Mathieu, Luyi Ding, and Claire C. Austin. 2011. "Canadian National Air Pollution Surveillance (Naps) Pm2.5 Speciation Program: Methodology and Pm2.5 Chemical Composition for the Years 2003–2008." *Atmospheric Environment* 45 (3): 673–86. https://doi.org/https://doi.org/10.1016/j.atmosenv.2010.10.024.