Recreating NAPS PM 2.5 Plots 2003-2008

Table 2: Number of samples by site

There are differences in the number of observations for all cities. Still need to investigate why.

station	city	number of samples	n_paper	diff
S100119	Burnaby	691	695	-4
S101004	Abbotsford	608	537	71
S103202	Golden	425	251	174
S30113	Halifax	161	177	-16
S40801	Canterbury	415	346	69
S50104	Montréal	622	554	68
S54401	Saint-Anicet	692	664	28
S60211	Windsor	373	267	106
S60427	Toronto	796	565	231
S62601	Simcoe	461	311	150
S90132	Edmonton	317	333	-16

Figure 2: Total $PM_{2.5}$ mass by site

There are differences from the boxplot in the paper - several outliers are missing (Burnaby, Edmonton)

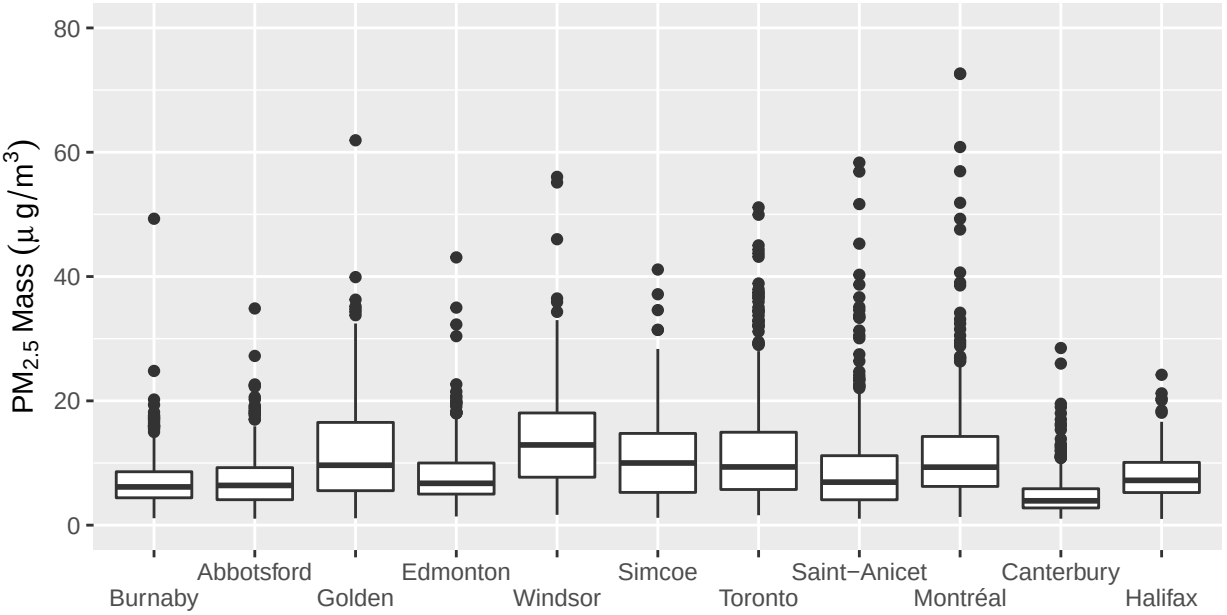


Figure 3: Monthly mean $PM_{2.5}$ mass by site

Trends are similar, 90% CI differs from the paper.

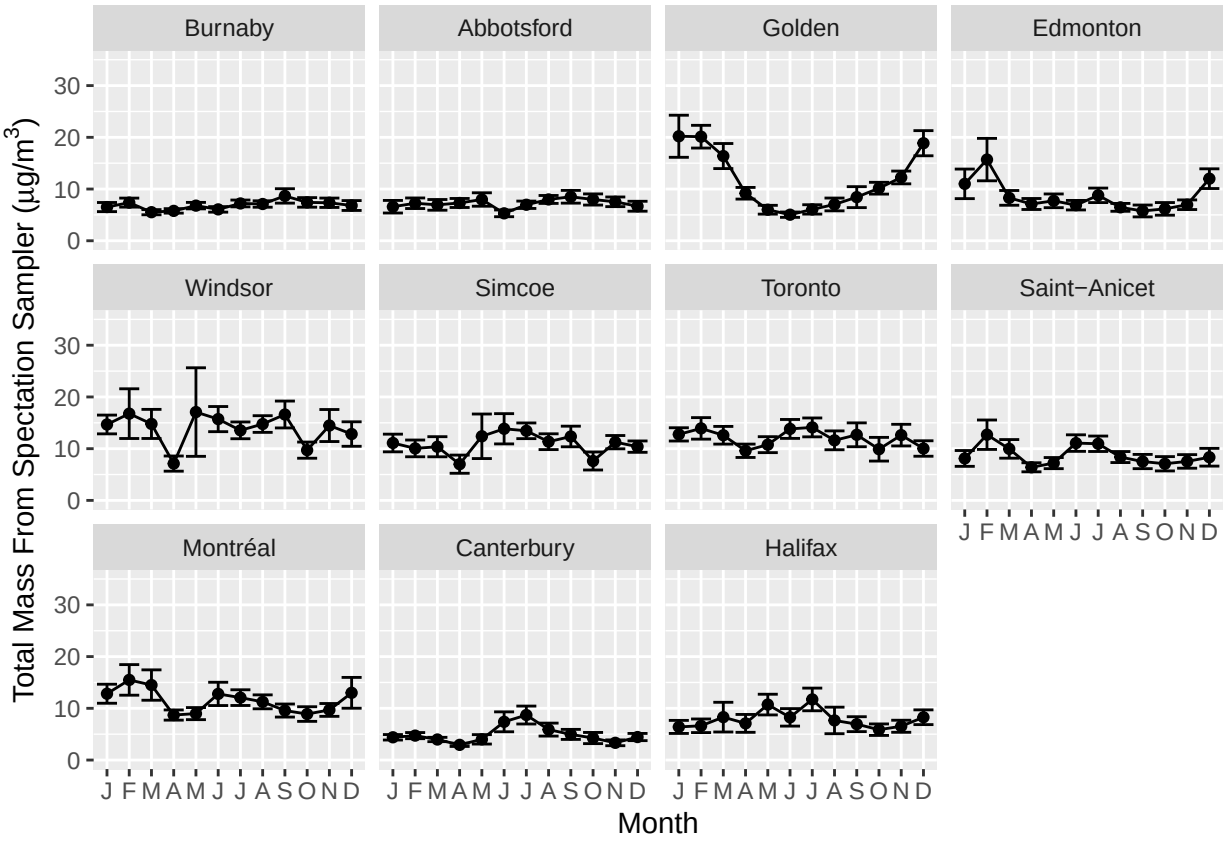
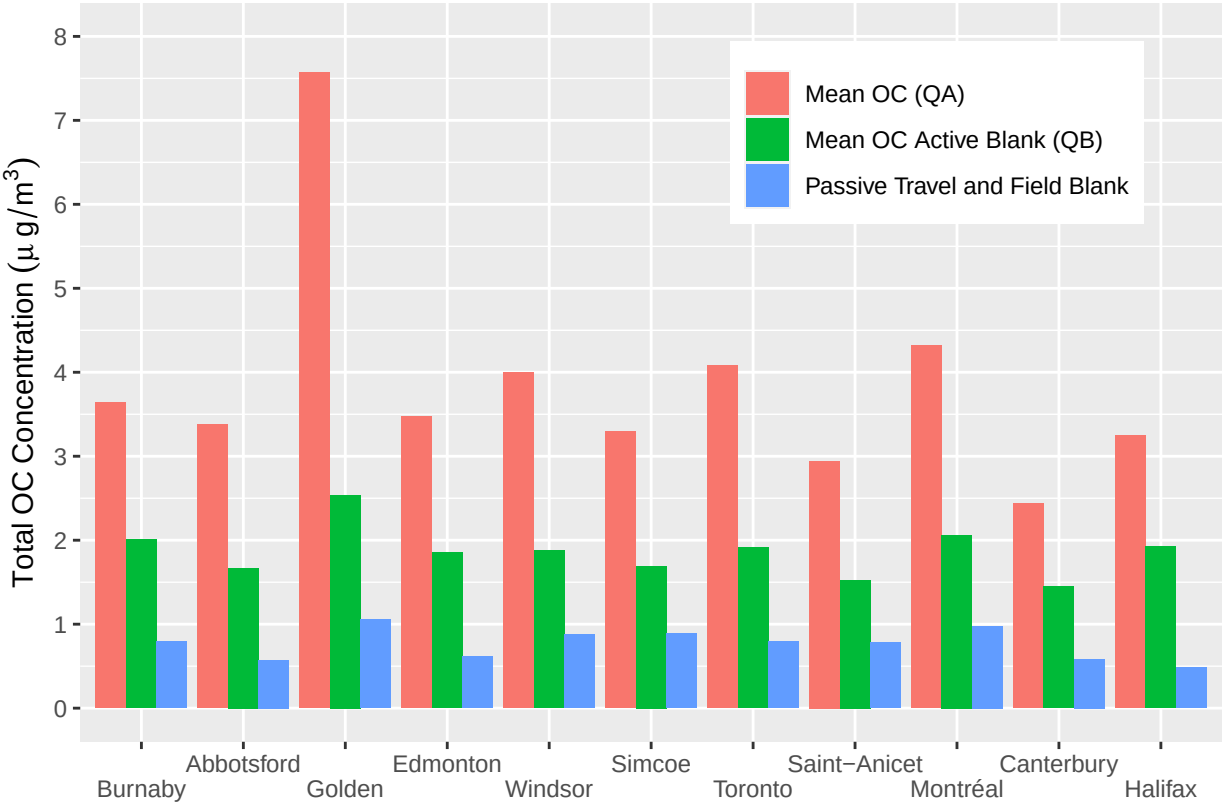


Figure 4: Mean organic carbon (OC) by site

Most evident difference from the paper is passive travel and field blank (blue) - still working on identifying the correct passive travel variable in the data.




```r
spec_data$city <- factor(spec_data$city, levels=rev(c("Halifax", "Canterbury",
                                "Saint-Anicet", "Montréal", "Toronto", "Simcoe",
                               "Windsor", "Edmonton", "Golden", "Abbotsford", "Burnaby")))
#-------------------------------------------------------------------------------
#-------------------------------------------------------------------------------
# Table 4: Compound composition
#-------------------------------------------------------------------------------
#-------------------------------------------------------------------------------

# now lets get the columns needed from spec data
comp_station <- spec_data %>%
  select('city','date', 'month',edxrf_silicon_si, edxrf_calcium_ca, edxrf_iron_fe,
         edxrf_titanium_ti, edxrf_potassium_k, speciation_mass_ug_m3, dich_pm2_5)


comp_station$SOIL_dat = 3.48*comp_station$edxrf_silicon_si + 1.63*comp_station$edxrf_calcium_ca +
                  1.63*comp_station$edxrf_iron_fe + 1.41*comp_station$edxrf_potassium_k +
                  1.94*comp_station$edxrf_titanium_ti
```

Figure 5: Reconstructed $PM_{2.5}$ mass by major component and site

Large differences from the paper - PBW, ASO4, OM

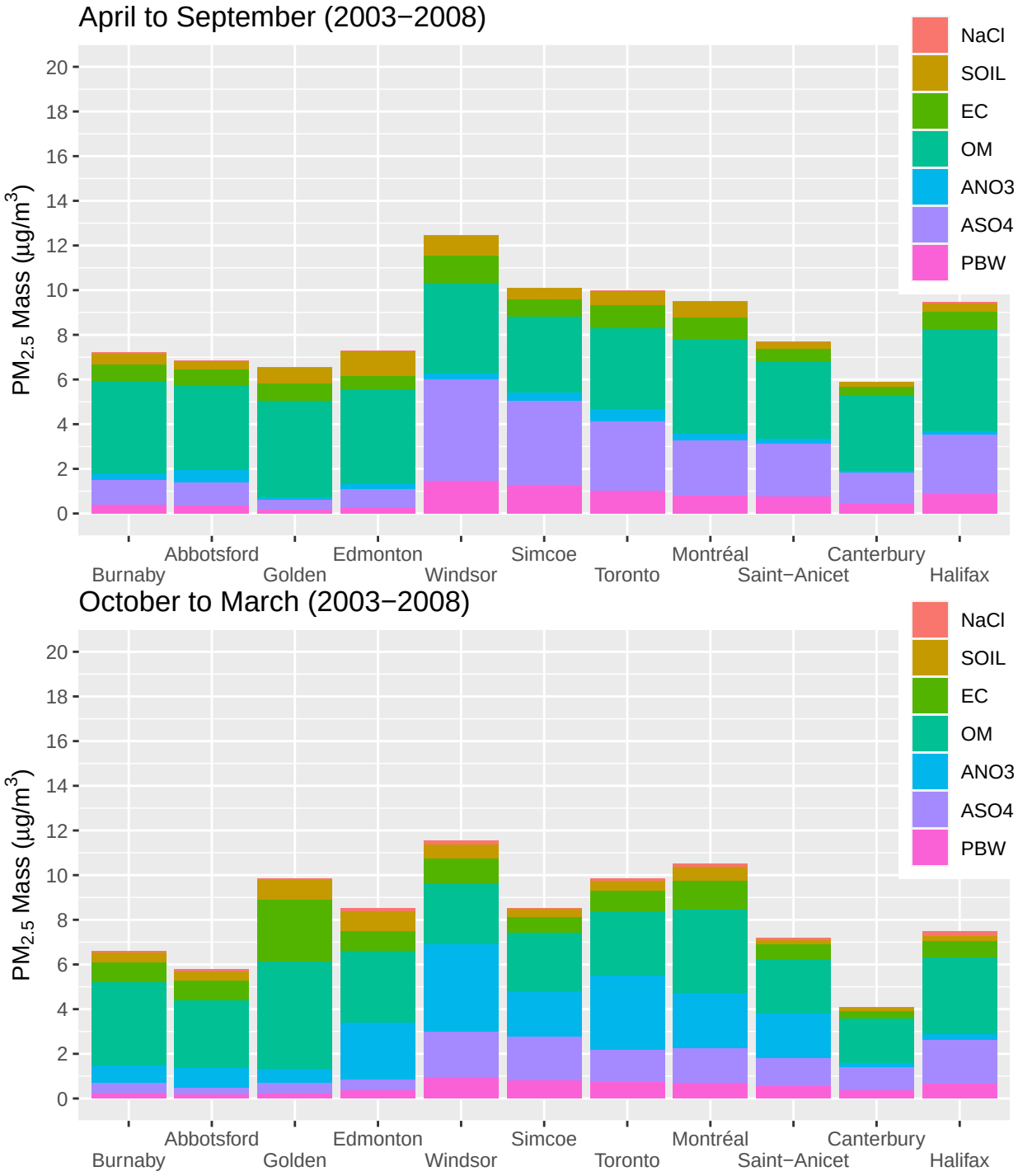
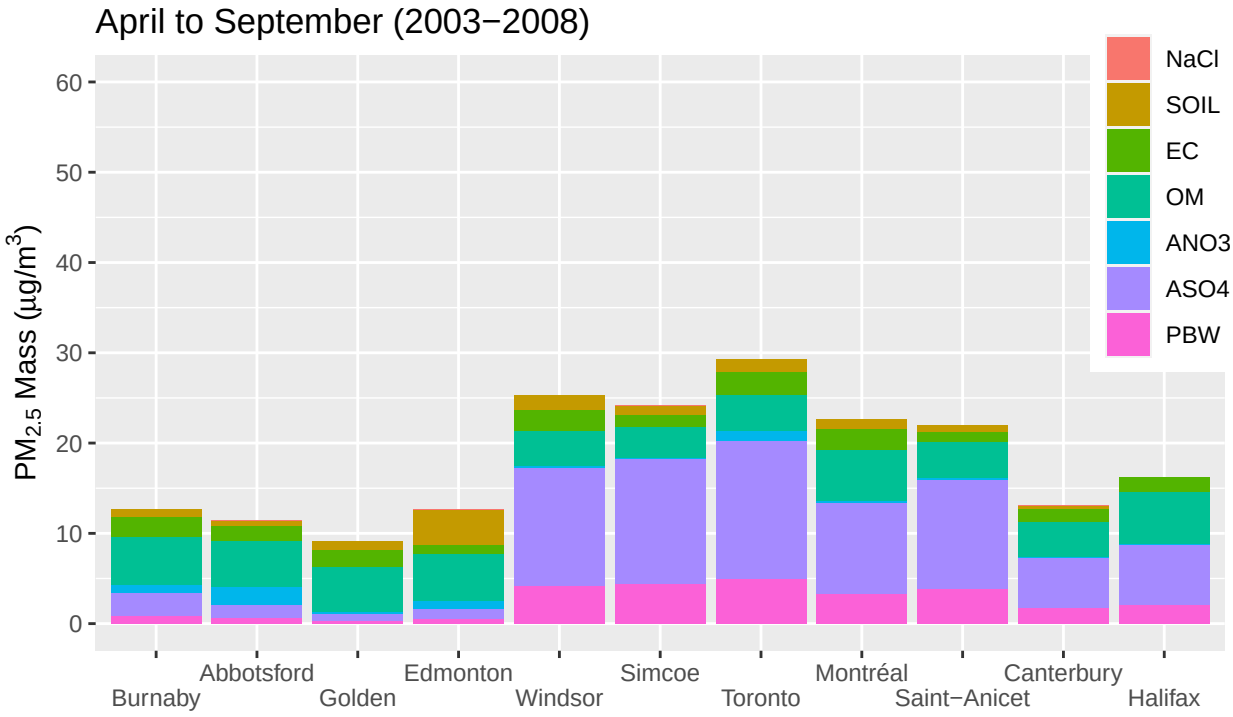


Figure 6: Reconstructed $PM_{2.5}$ mass by 10 highest mass days and site

Large differences from the paper - PBW, ASO4, OM

Paper stated that "Mean total mass concentration exceeded 30 mg m3 for the 10 highest days at the Ontario and Quebec urban sites in both summer and winter". Statement is not consistent with my findings, mean total mass for those sites were (27, 39) for summer and (24, 50) in winter.

```
## Warning: Removed 1 rows containing missing values (position_stack).
```



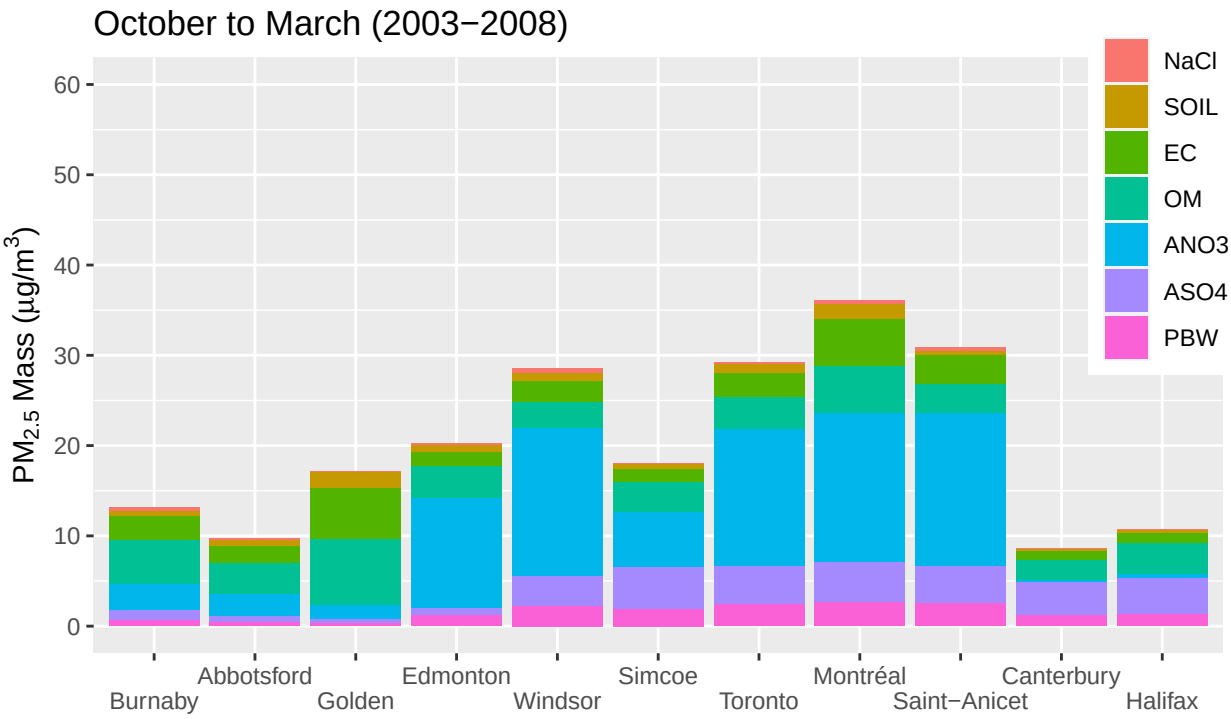


Figure 7: Median ammonium sulphate and ammonium nitrate concentrations by site and month

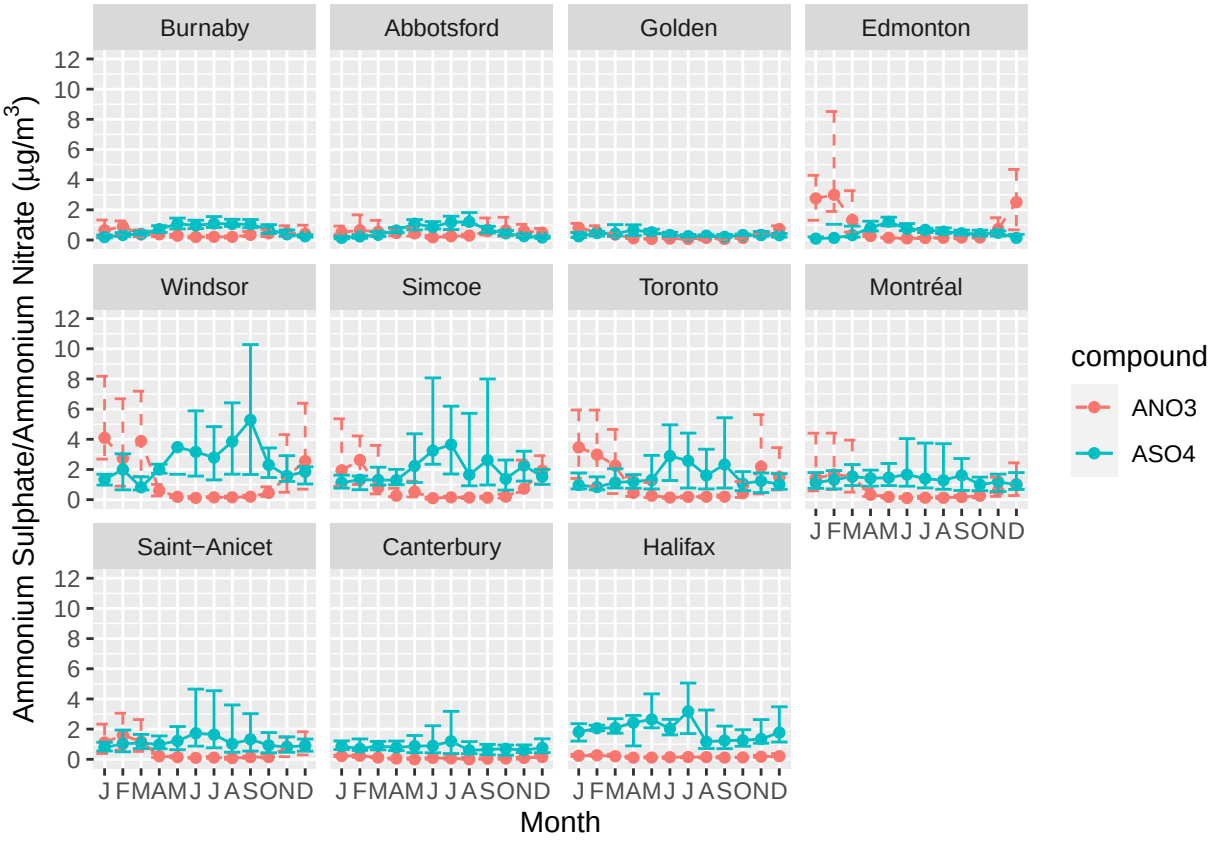
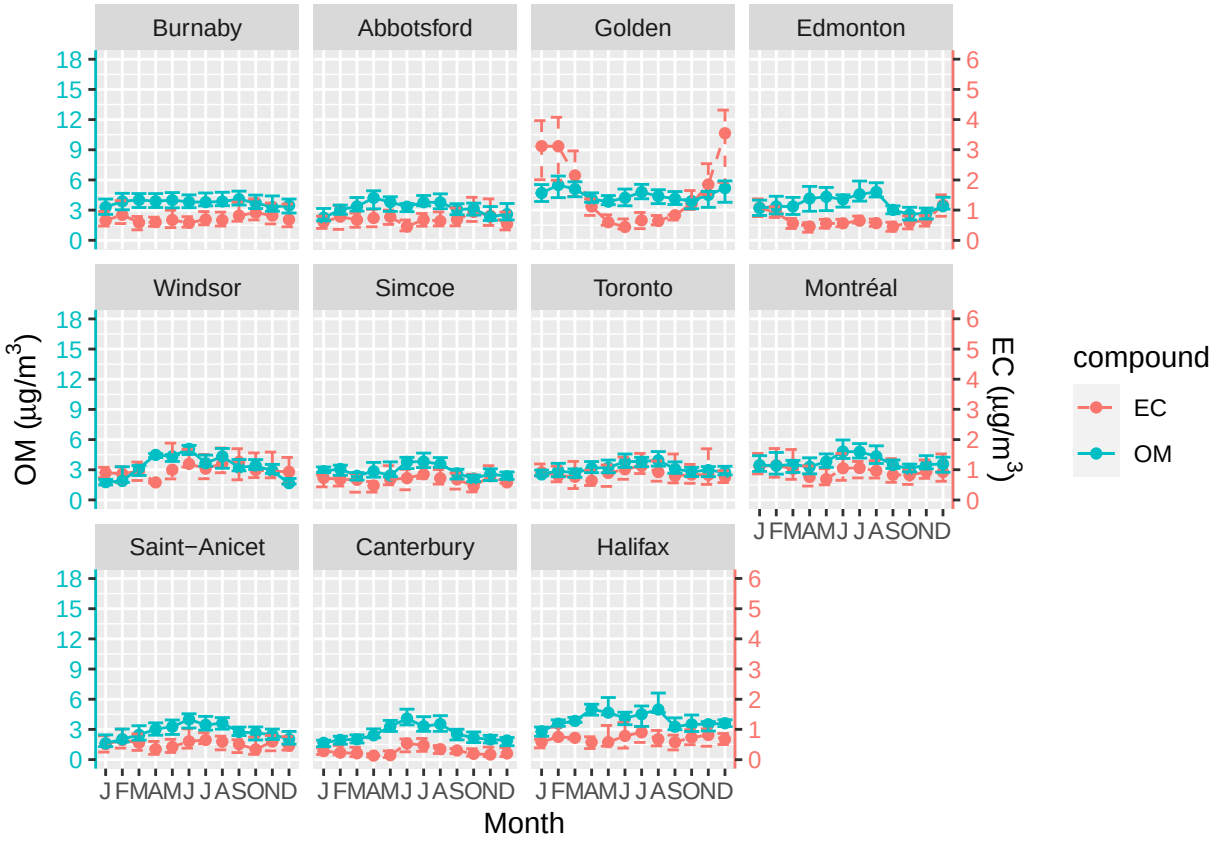


Figure 8: Median elemental carbomn (EC) and organic matter (OM) concentrations by site and month



comp_station_orig <- comp_station_orig[with(comp_station_orig, order(date, city)),] # Figure 9: Median soil and sodium chloride concentrations by site and month Issue with Simcoe data point

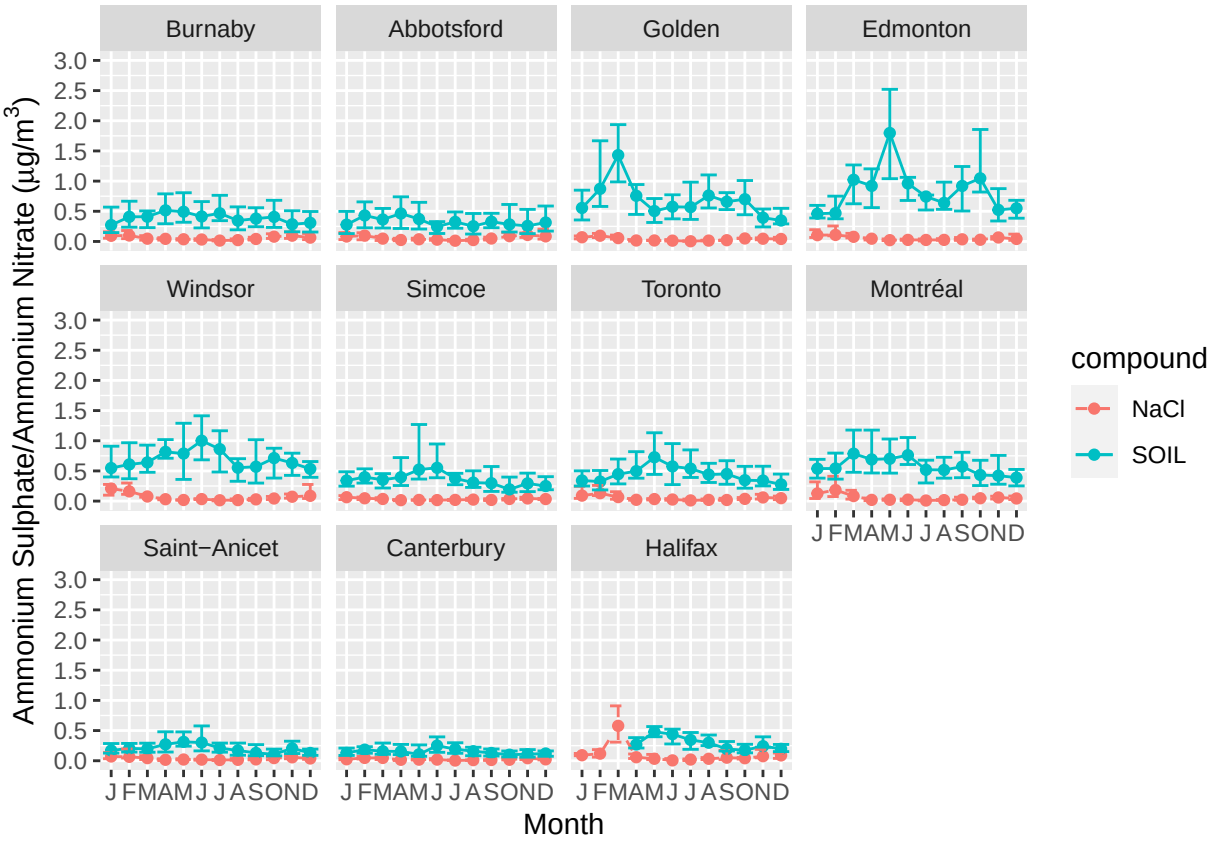


Figure 10: Ammonia mixing ratio by site and month

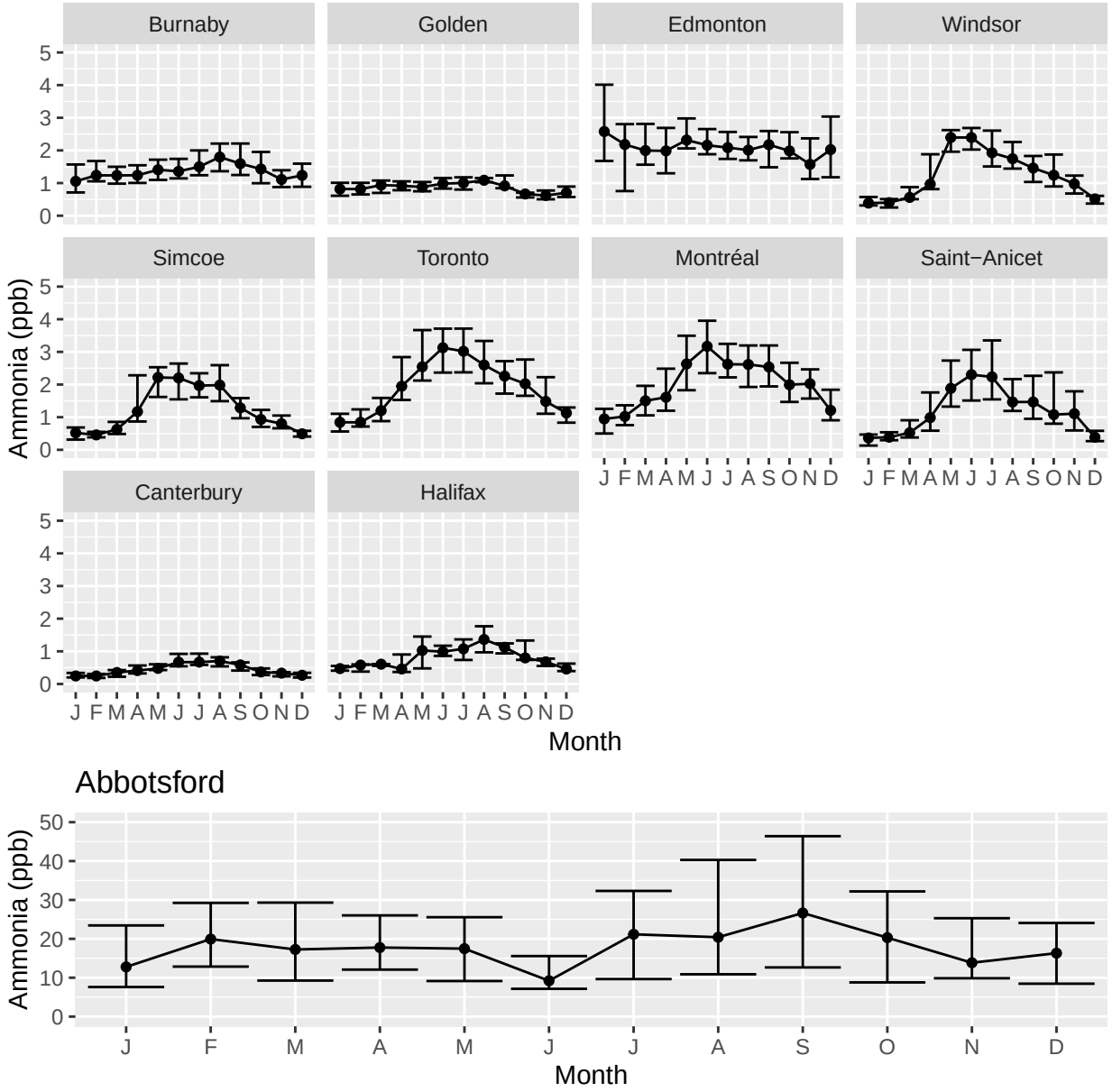


Figure 11: Median sulphr dioxide mixing ratio and nitric acid concentrations by site and month