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*Supplement of*

## **High-resolution quantification of atmospheric CO<sub>2</sub> mixing ratios in the Greater Toronto Area, Canada**

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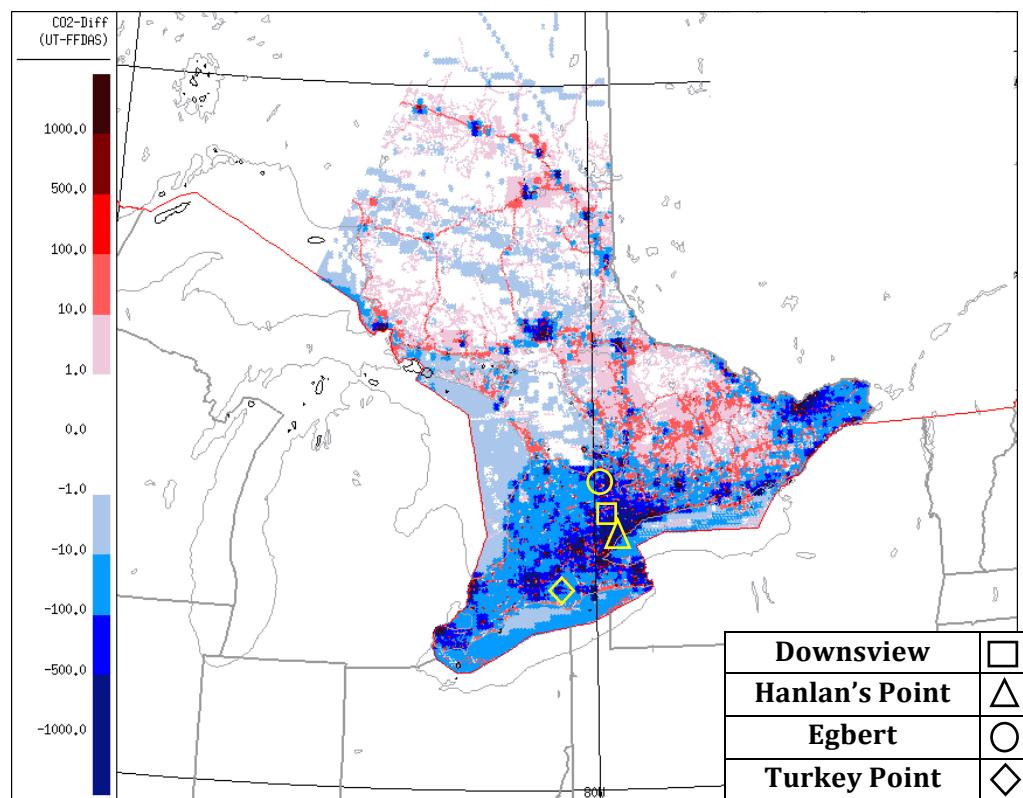
**Table S1: Facility-specific CO<sub>2</sub>:CO ratios for the point sector**

Specific Point Sources from 1A1a (NAICS Code: 2211)			
Name	CO <sub>2</sub> (kt)	CO (kt)	CO <sub>2</sub> :CO (kt CO <sub>2</sub> /kt CO)
Brighton Beach	233.3	0.28	842
Bruce Power	69.0	0.03	2091
Cardinal Power	562.1	0.06	9527
Cochrane Generating Station	1113.3	0.34	3323
East Windsor Cogeneration Center	124.3	0.05	2345
Essar Power Canada ltd.	1502.4	0.48	3137
Goreway Power Station	1209.8	0.72	1680
Greenfield Energy Center	937.9	2.18	431
Halton Hills Generating Station	397.0	0.07	5839
Iroquois Falls Generating Station	321.0	0.07	4864
Kapuskasing Power Plant	136.6	0.03	4268
Kingston Cogen	332.0	0.05	6775
Kirkland Lake Generating Station	321.9	0.63	513
Lake Superior Power	203.1	0.06	3692
Lambton Generating Station	3289.9	1.41	2337
Lennox Generating Station	120.1	0.07	1819
Mississauga Cogeneration Plant	363.8	0.13	2756
Nanticoke Generating Station	8544.1	3.40	2513
North Bay	133.5	0.03	4170
Ottawa Health Sciences Center Cogeneration Facility	220.0	0.07	3013
Plasco Trail Road	3.2	0.02	154
Portlands Energy Centre	457.3	0.34	1333
Sarnia Cogen Plant	362.4	0.22	1618
Sarnia Regional Cogeneration Facility	1194.2	0.40	2971
St. Clair Energy Center	357.6	0.29	1216
Thorold Cogen Generating Station	305.5	0.20	1543
Tunis Power Plant	109.3	0.08	1401
Whitby Cogeneration	189.3	0.09	2175
Windsor Essex Cogeneration Plant	202.1	0.07	2846
Hagersville Mine	52.0	0.04	1406
Beachville Operation	487.6	0.24	2008
Dundas Operation	406.4	0.23	1744
Northern Lime Limited	90.8	0.09	1032
Copper Cliff Nickel Refinery	51.3	0.03	1654
Copper Cliff Smelter	201.1	0.10	1971

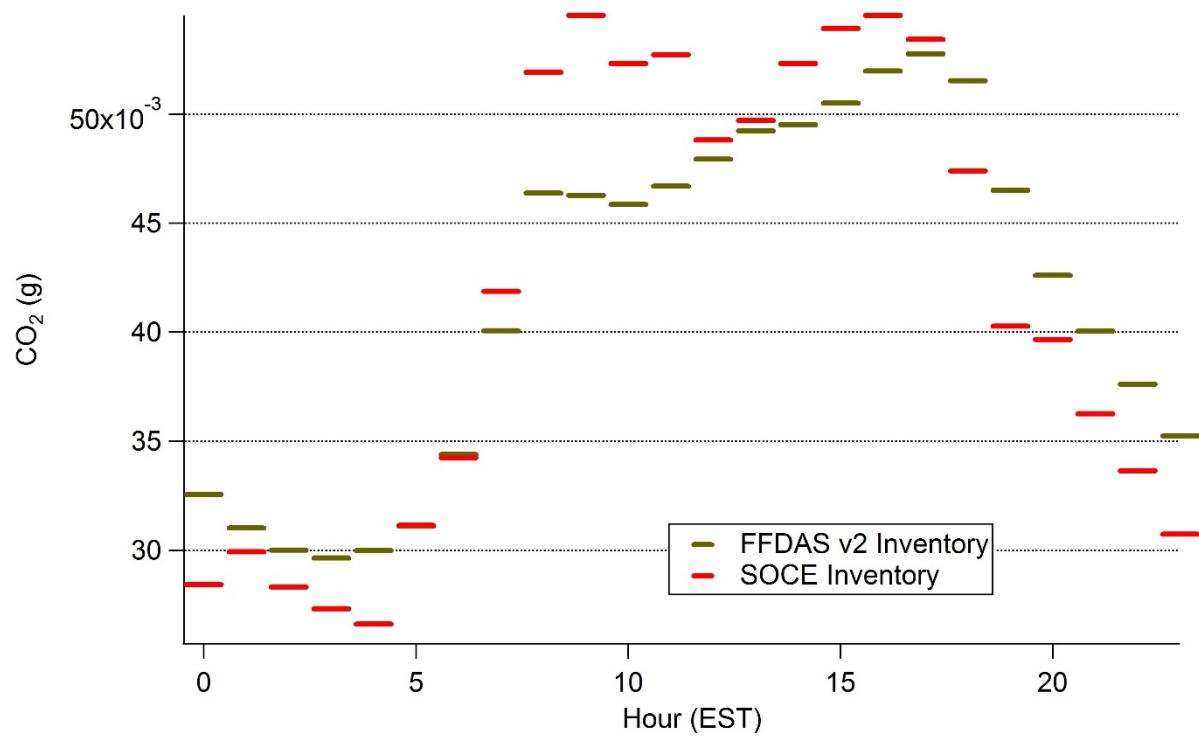
<b>Specific Point Sources from 1A2f (NAICS Code: 3241)</b>			
<b>Name</b>	<b>CO<sub>2</sub> (kt)</b>	<b>CO (kt)</b>	<b>CO<sub>2</sub>:CO (kt CO<sub>2</sub>/kt CO)</b>
Mississauga Lubricants Center - Petro-Canada	365.04	0.08	4680
Nanticoke Refinery - Imperial Oil	1058.08	7.83	135
Sarnia Manufacturing Center	759.47	0.34	2234
Sarnia Refinery- Suncor	628.00	4.69	134
Sarnia Refinery Plant - Imperial Oil	1270.44	2.43	523
<b>Specific Point Sources from 2C1 (NAICS Code: 3311)</b>			
<b>Name</b>	<b>CO<sub>2</sub> (kt)</b>	<b>CO (kt)</b>	<b>CO<sub>2</sub>:CO (kt CO<sub>2</sub>/kt CO)</b>
Dofasco Hamilton	4939.9	9.23	535
Essar Steel Algoma Inc.	2219.1	0.90	2468
Gerdau Whitby	83.7	0.28	295
Hamilton Works - U.S. Steel Canada	2674.7	2.45	1093
Ivaco Rolling Mills	74.5	0.20	369
Lake Erie Works - U.S. Steel Canada	1387.6	1.49	931

**Table S2: Grouping of EDGAR v4.2 SNAP sectors to SOCE inventory sectors**

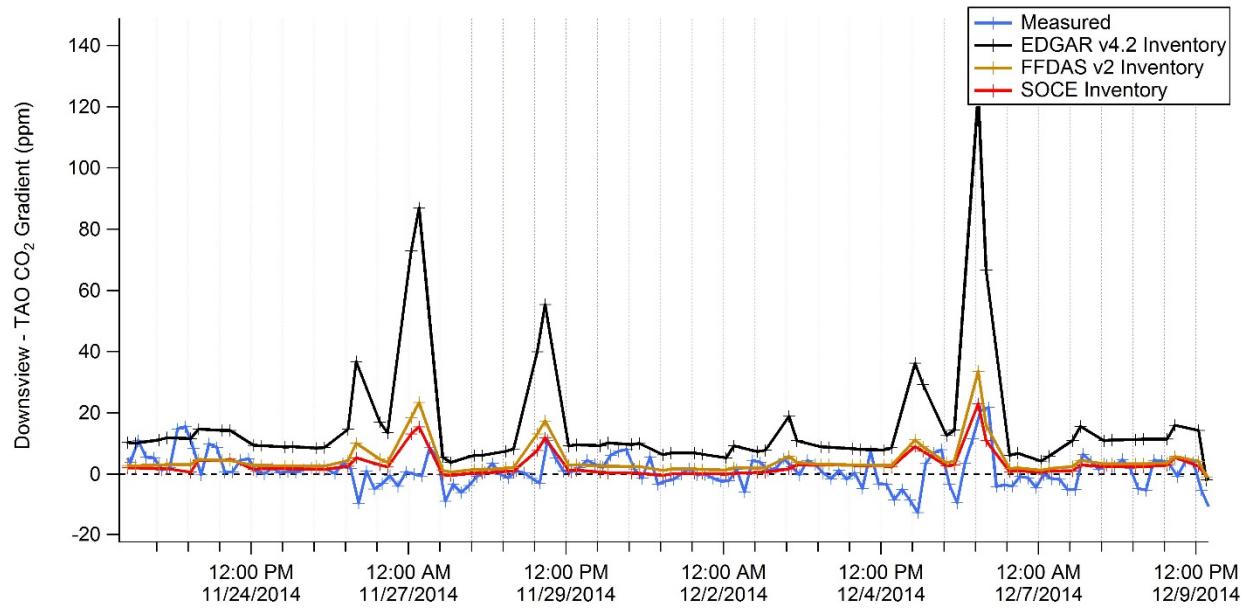
SOCE Sector	EDGAR v4.2 SNAP Sectors
Area	1A4 + (6A+6C) + 1A2 + 1A1a + 2C + 2A
Point	1B2a + (4C+4D) + (2B+3) + 1A2 + 1A1a + 2C + 2A
Marine	1A3d
On-road	1A3b
Off-road	1A3a + 1A3c + 1A3e + 1A3d



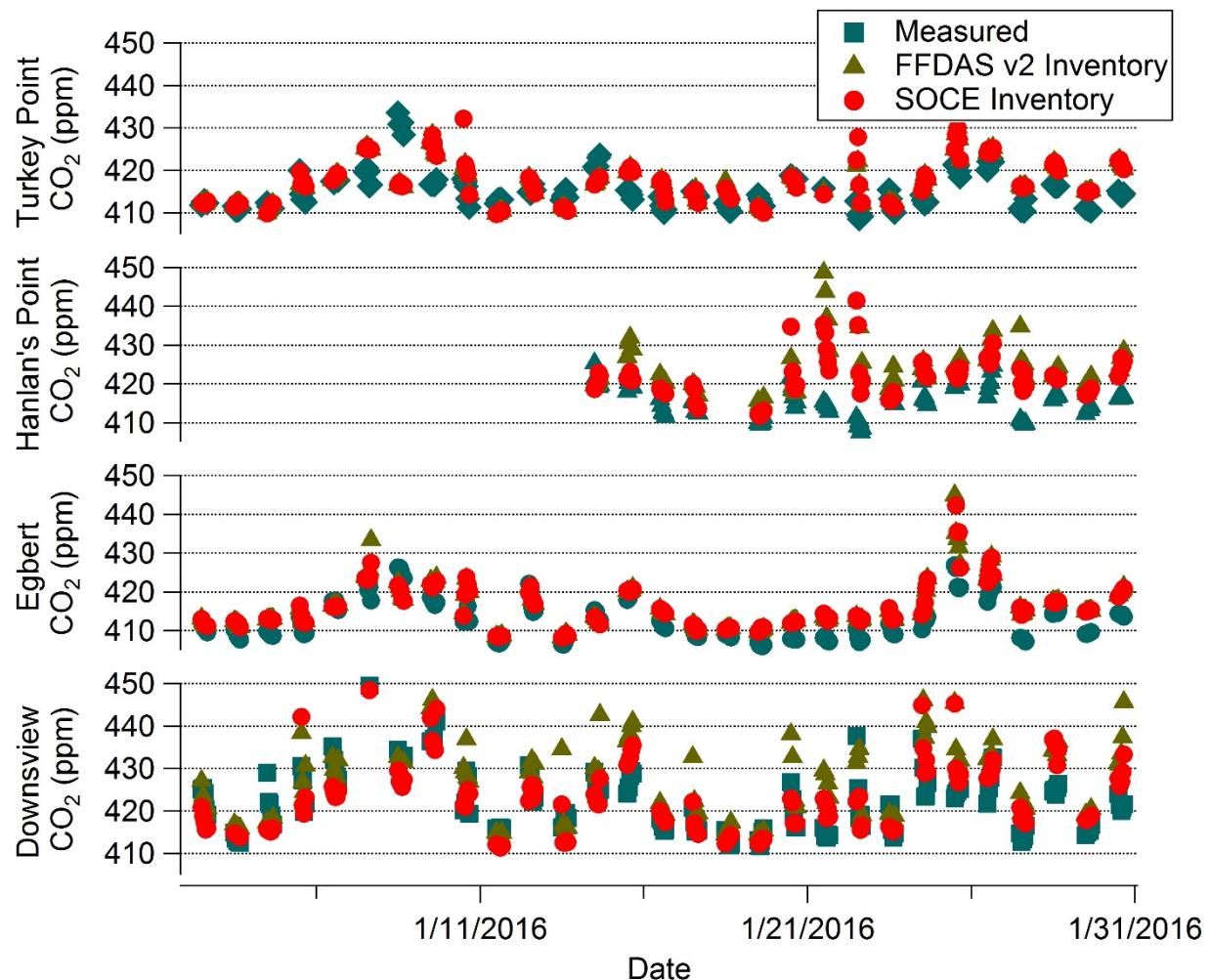
**Figure S1:** Annual mean difference in anthropogenic CO<sub>2</sub> emissions (units: g CO<sub>2</sub>/second/grid cell) between the SOCE and the FFDAS v2 inventories (SOCE - FFDAS v2) for a weekday in February 2010. Locations of in-situ measurements of CO<sub>2</sub> are shown



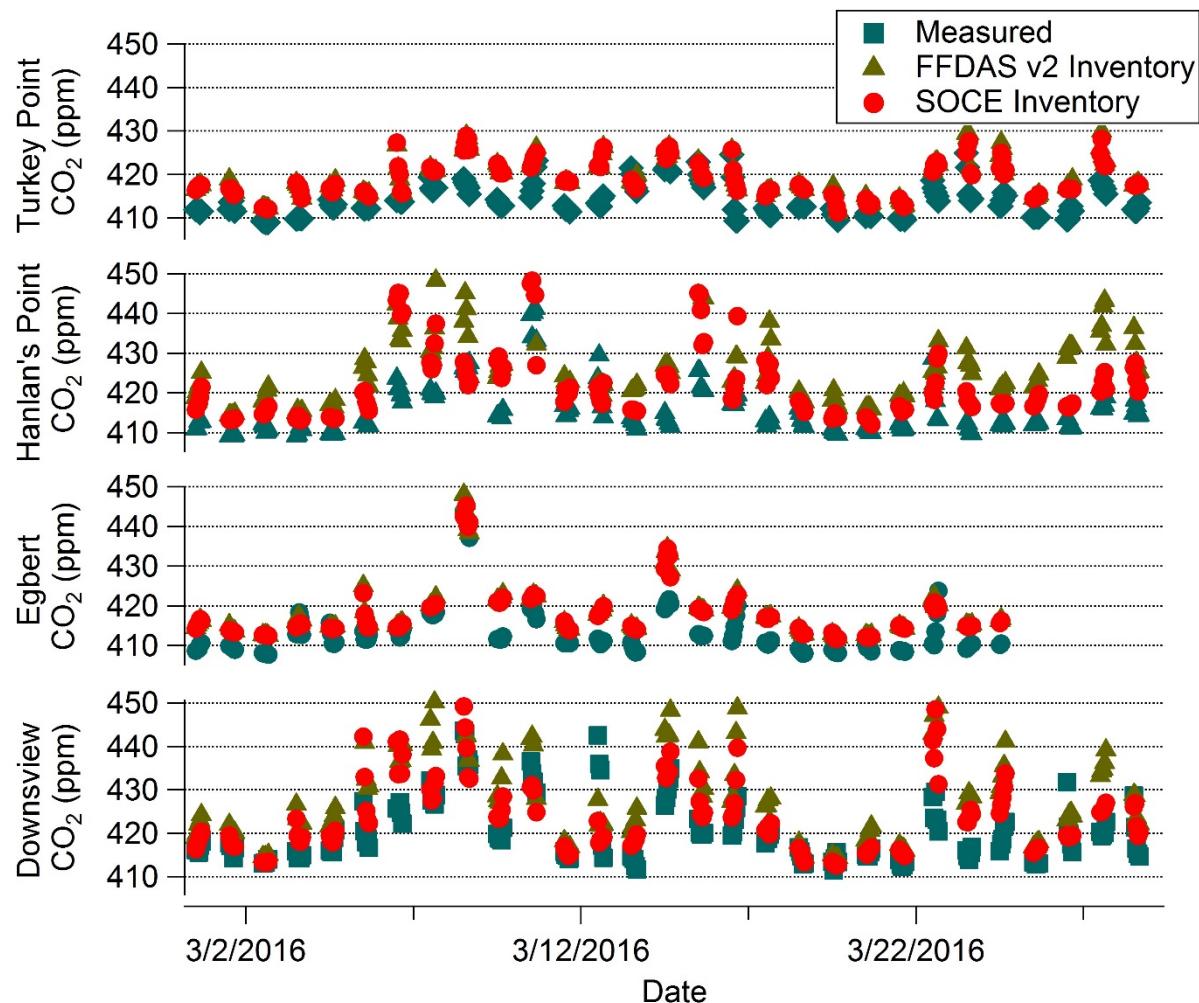
**Figure S2:** Diurnal profile of CO<sub>2</sub> emissions (grams) estimated by the FFDAS v2 and SOCE inventories for January-March for the black-box domain in Figure 2a.



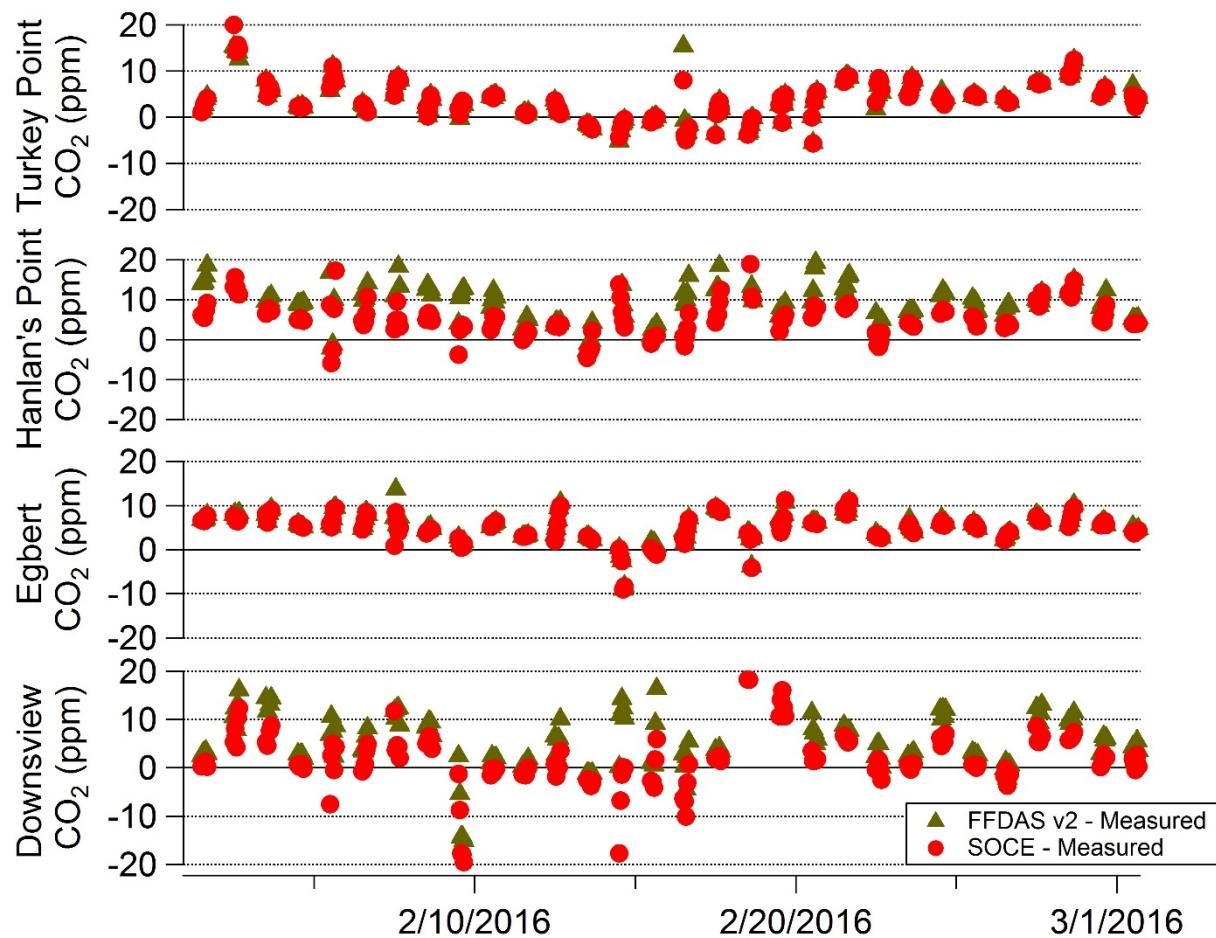
**Figure S3: Time series of measured (blue) and modelled Downsview - TAO gradient CO<sub>2</sub> mixing ratios. The black, red and gold lines are the modelled mixing ratios when using the EDGAR v4.2, FFDAS v2 and SOCE CO<sub>2</sub> inventories, respectively.**



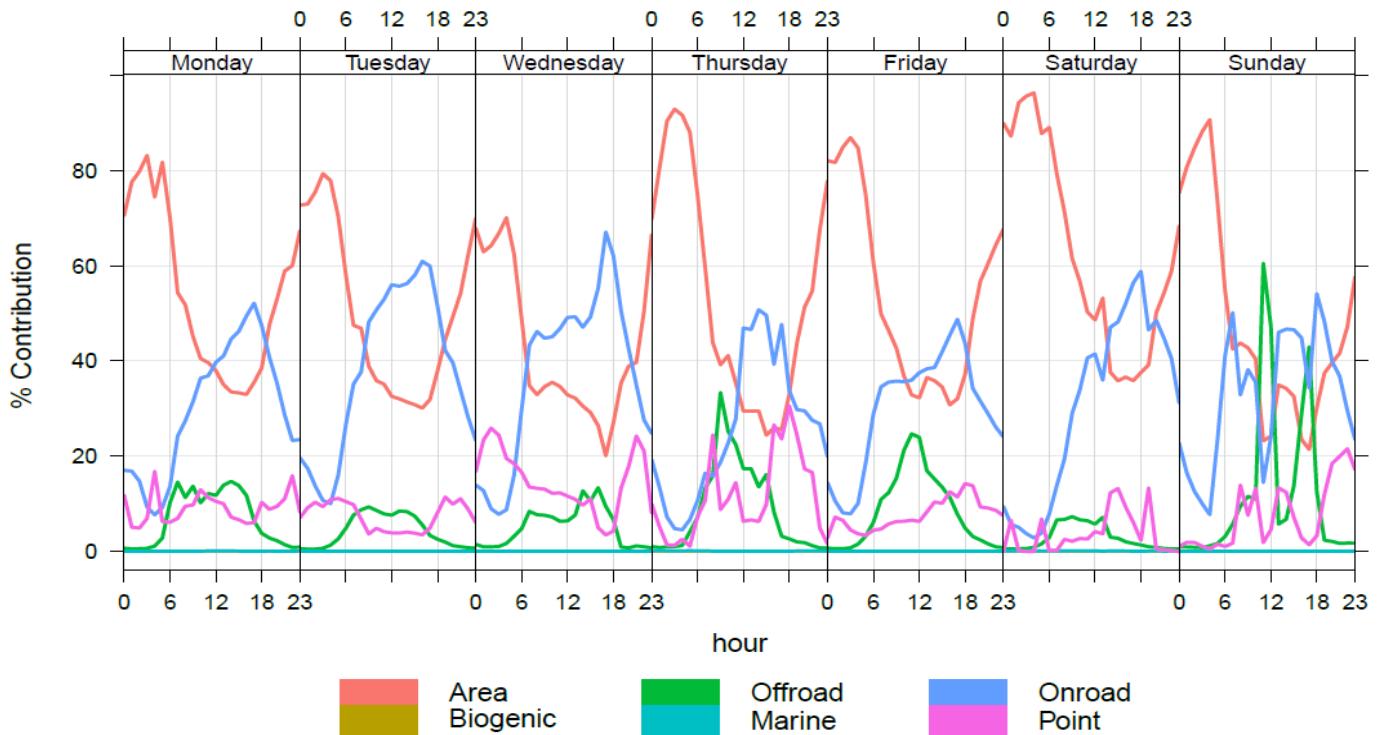
**Figure S4:** Time series of measured (blue) and modelled January afternoon (12:00-16:00 EST) CO<sub>2</sub> mixing ratios for the four sites used in this study. The red and gold markers are the modelled mixing ratios when using the SOCE CO<sub>2</sub> inventory and the FFDAS v2 inventory, respectively.



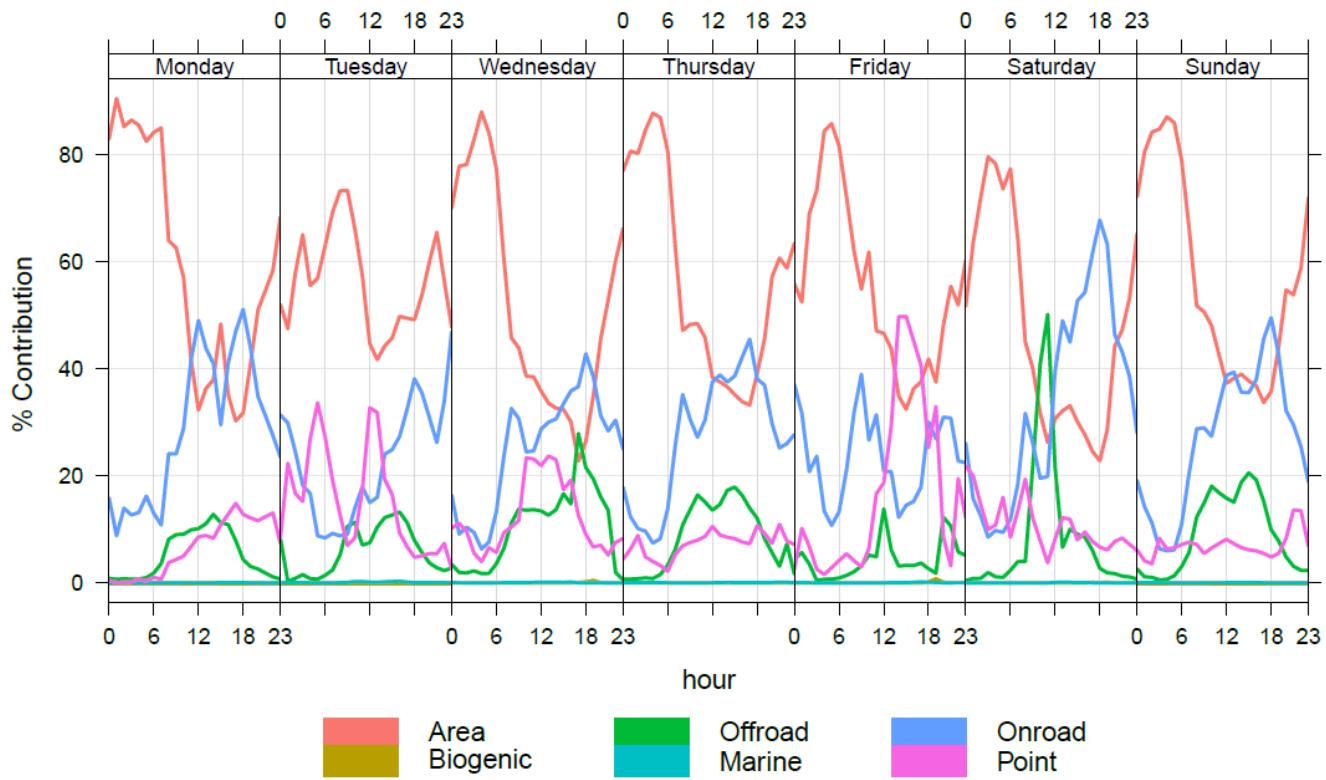
**Figure S5:** Time series of measured (blue) and modelled March afternoon (12:00-16:00 EST) CO<sub>2</sub> mixing ratios for the four sites used in this study. The red and gold markers are the modelled mixing ratios when using the SOCE CO<sub>2</sub> inventory and the FFDAS v2 inventory, respectively.



**Figure S6:** Time series of the difference between modelled and measured CO<sub>2</sub> mixing ratios in February (12:00-16:00 EST) for the four sites used in this study. The red and gold markers are the differences when using the SOCE CO<sub>2</sub> inventory and the FFDAS v2 inventory, respectively.



**Figure S7: Modelled sectoral percent contributions to diurnal local CO<sub>2</sub> enhancement for January 2016 at Downsview averaged by day of week. Note: Area = Area + Residential natural gas combustion + Commercial natural gas combustion. (Time zone is EST).**



**Figure S8: Modelled sectoral percent contributions to diurnal local CO<sub>2</sub> enhancement for March 2016 at Downsview averaged by day of week. Note: Area = Area + Residential natural gas combustion + Commercial natural gas combustion. (Time zone is EST).**